PLASTICS

A Periodical Devoted to the Manufacture and Use of Composition Products

OCTOBER, 1927

Molded Products

See Page 551

Toilet Accessories of KAROLITH Blend Harmoniously With the Many Other Toilet Accessories on Milady's Dressing Table

KAROLITH

TOILET accessories made of Karolith are tempting to every feminine buyer.

Made of Karolith — they are pleasing to the eye—are practically indestructible— and possess the attributes of costlier materials. Odorless, tasteless and the colors fast to sunlight.

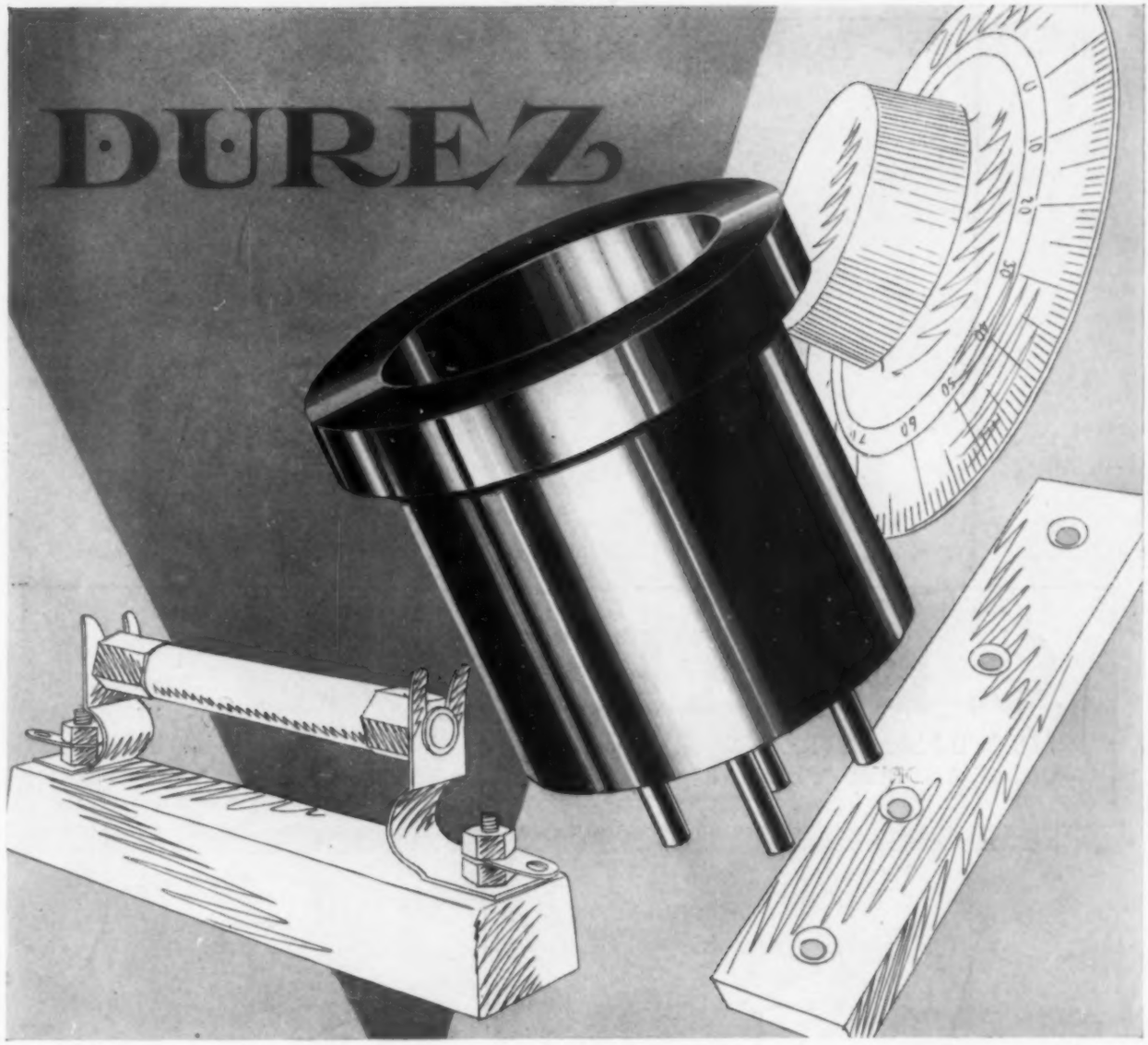
Using Karolith as your raw material, you can produce an endless variety of articles that are at once useful and beautiful. The texture, brilliance, and unlimited color range of Karolith assure you beauty. The strength, lightness and durability of Karolith guarantee usefulness. And Karolith is so easy and economical to work!

Progressive manufacturers everywhere are making profitable use of Karolith—Why don't you investigate its advantages today?

KAROLITH CORPORATION

189-207 Thirteenth Street, Long Island City, N. Y.

PLASTICS, Vol. 111, No. 10 October 1927. Publication office 49 E. Washington Avenue, Washington, N. J. Executive office, 471 Fourth Ave., New York City, N. Y., by The Hoffman Publications, Inc., Sylvan Hoffman, President. Subscription price, Domestic $3.00 per year, 35c per copy. Foreign and Canada, $4.00 per year. Entered as second-class mail at the Post Office at Washington, N. J., under the act of March, 1879, and copyright, 1927, by The Hoffman Publications, Inc.



Molded with DUREZ means *extra strength, unusual durability, exceptional accuracy*

MANY of the long list of applications of Durez to molded parts are the direct result of its mechanical ability — its physical strength. Durez replaces many materials—even metals—because it has stamina and endurance unusual in a plastic. Use it for parts with thin sections, when lightness and strength are essential.

Molded Durez is lustrous and hard, without being brittle. It is molded in hot presses under a tremendous pressure that makes its structure dense and tough. Durez resists wear indefinitely and will not check, scar or crack.

Durez has mold-ability that reproduces the most complex and close-dimensioned parts with great accuracy. The exact duplication of Durez molded parts facilitates assembly. Durez further reduces manufacturing costs by making machining and finishing unnecessary. Several parts made of some other material often can be consolidated into a single piece when Durez is used to mold it.

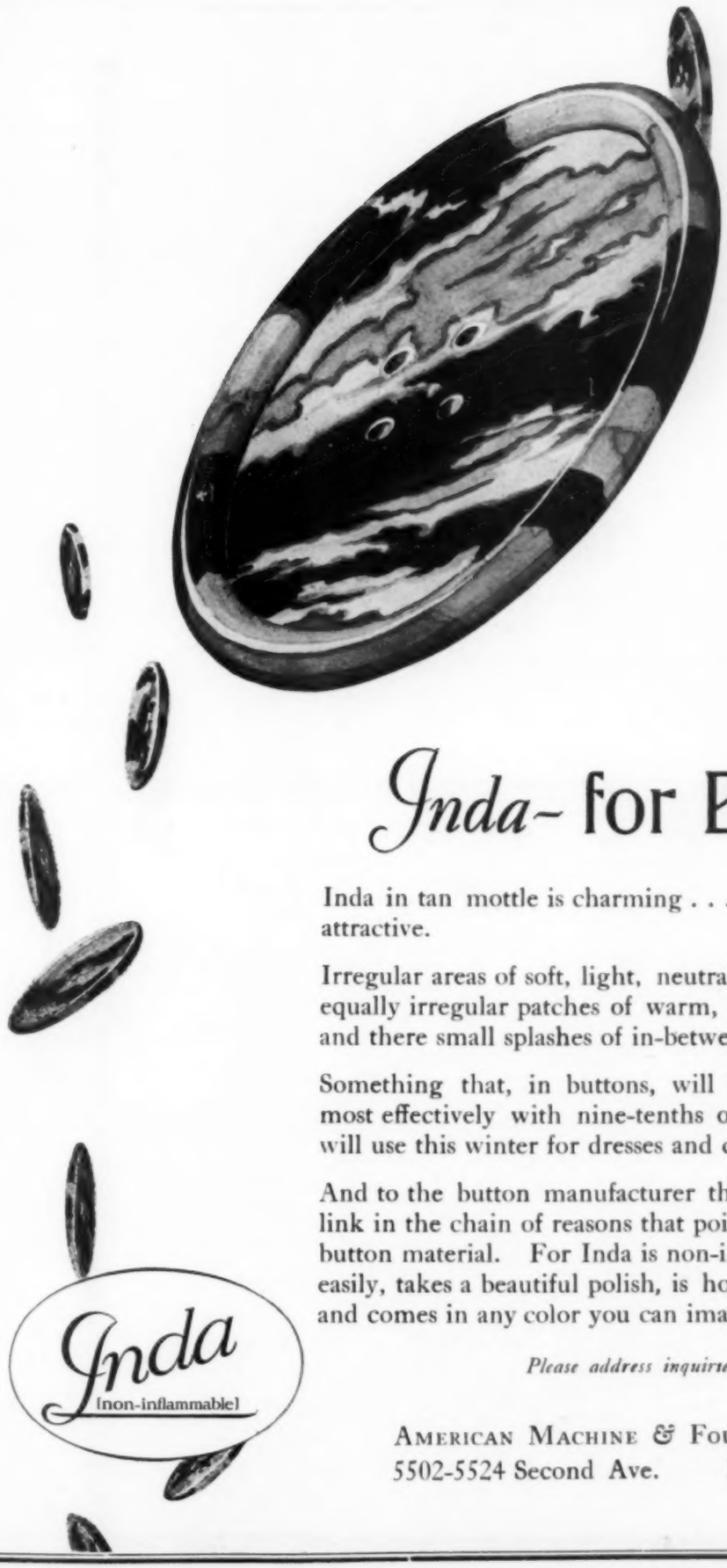
This is an era of plastic molding. Increase your production, improve your product with Durez. Consult the Durez laboratory about the use of molded parts in your plant. The services of experienced chemists and engineers are at your disposal without obligation.

Molded samples of Durez and complete information on its properties supplied on request. Specify use and color.

GENERAL PLASTICS
INCORPORATED
NORTH TONAWANDA, NEW YORK
CHICAGO NEW YORK SAN FRANCISCO

DUREZ

SEND FOR THE BOOKLET, "DOING IT WITH DUREZ"



Inda- for Buttons

Inda in tan mottle is charming . . . . . and marvelously attractive.

Irregular areas of soft, light, neutral tan, interspersed with equally irregular patches of warm, dark brown, and here and there small splashes of in-between shades.

Something that, in buttons, will harmonize or contrast most effectively with nine-tenths of the materials milady will use this winter for dresses and coats.

And to the button manufacturer this is simply one more link in the chain of reasons that point to Inda as the logical button material. For Inda is non-inflammable, is worked easily, takes a beautiful polish, is homogenous throughout, and comes in any color you can imagine.

Please address inquiries to

AMERICAN MACHINE & FOUNDRY COMPANY
5502-5524 Second Ave. Brooklyn, N. Y.

PLASTICS
& MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 3 OCTOBER, 1927 No. 10

Contents

Carl Marx, B. Ch., Editor
A. Moses, B. Sc., A. I. C., Associate Editor
William Grünstein, E. E., A. M., Associate Editor V. C. Rockhill, Consulting Editor
A. C. Blackall, British Correspondent Heinrich Prehn, German Correspondent

Publication Office: Washington, N. J.
Offices: 471 4th Ave., New York. Telephones: Ashland 6280, 6281
SYLVAN HOFFMAN, Publisher ALAN COHEN, Adv. Director
E. D. Sheriffs, Chicago Representative
80 E. Jackson Blvd.

Subscription Price—U. S. $3.00, Foreign $4.00 Per Year Issued Monthly—35 cents a copy

PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 3 OCTOBER, 1927 No. 10

Recent Advances in Condensation Products

Inventors here and abroad are continually adding to our store of knowledge in this field and are furnishing us with improved products

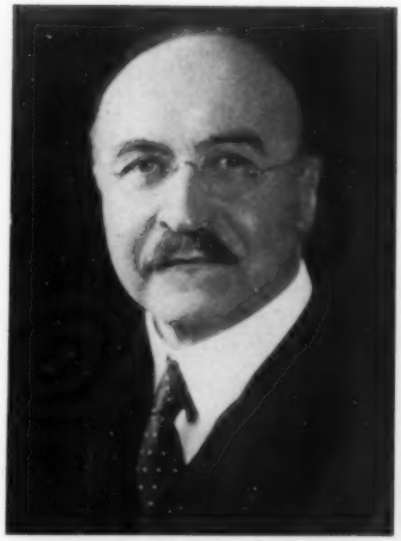
By Carl Marx

SO great are the present activities of the inventors in the field of condensation products and artificial resins, that by far most of the patents issuing within the past half year bear face evidence of a long battle with the prior art before emerging in their final form. Some of them have been in the Patent Office since 1920 and 1922, and only one has been there less than two years.

Development Is In The Hands of Large Companies

From the assignees appearing of record it seems that the developments are in the hands of large organizations, such as the Westinghouse Electric & Mfg. Co., Bakelite Corp., and the German Dye Trust. With research and application thus concentrated in the able scientific organizations of these huge concerns steady progress in this field seems assured.

A combination of totally or partially parchmentized cellulose with phenol and formaldehyde, to form a sort of complex condensation product in which the cellulose molecule is believed to be combined with the other ingredients, is the achievement of Henry C. P. Weber of Edgewood Park Pa., whose patent 1,630,365, May 31, 1927 (application Sept. 24, 1920) is assigned to the Westinghouse Electric & Mfg. Co.



Dr. Leo H. Baekeland
Inventor of Bakelite

His work in the field of condensation products has revolutionized the production of molded insulation, and all modern progress along these lines received its inspiration from his researches.

To achieve this result, a fiber such as cellulose, is parchmentized, as with zinc chloride or sulfuric acid; or with sodium zincate or caustic soda. No attempt is made to remove the parchmentizing agent, but this is left with the treated cellulose to act as a catalyst in the condensation which follows. The treated fiber or fabric is then dipped into liquefied phenol, and the excess phenol squeezed out. The material is then saturated with formaldehyde or its equivalent and subjected to heat to effect the condensation.

Combining Parchmentized Cellulose and Phenol

A practical illustration is as follows:

A sheet of paper, generally in the form of a roll, is continuously passed through a parchmentizing agent such as a 20% solution of caustic soda, containing 10 to 15% of sodium chloride (common salt); then into a bath of phenol, and then through a chamber containing vapors of formaldehyde. The sheet of paper so treated is then passed between hot rolls where pressure is applied, forming an intermediate condensation product which is soluble and fusible. At this point, it is sometimes desirable to remove the parchmentizing agent, which is readily done by passing the sheet through water, after which it is dried, preferably in vacuum. The paper is thus thoroughly impregnated with the inter-

mediate condensation product. It is then rolled up for shipment, or cut up directly into the desired form, as for instance discs, a number of which are assembled and molded under heat and pressure into the final product.

Condensation products containing from 10 to over 300% of the original weight of the cellulose have been prepared by this method. The broadest claim protects a "method of forming a condensation product which consists in treating cellulose with a parchmentizing agent, treating the cellulosic material with a phenol and then treating the mixture with formaldehyde to form resinous material."

Cresol and China Wood Oil in New Combination

Two closely related patents have issued to the same company as the result of applications on inventions made by Arthur L. Brown, applied for in 1922 and 1924 respectively. The first of these, U. S. P. 1,632,113, June 14, 1927, covers a phenolic condensation product made from cresol with the addition of a substance termed *"tox tungate"*, which is a drier derived from China wood oil (tung oil).

Reference is made by the inventor to co-pending applications for patents, in which condensation products of China wood oil, phenol and formaldehyde, with or without the "tox tungate" are described. The present patent covers the following process.

A Practical Example

Four parts by weight of cresol and one-tenth of one part by weight of "tox tungate" solid are mixed and heated to 115°C. until solution is complete. Three parts by weight of a 40% solution of formaldehyde are heated to boiling in a vacuum kettle having a reflux condenser attached thereto. The solution of cresol and drier is poured into the vacuum kettle by means of a pipe connection and a temperature of from 93 to 98°C. is maintained for about 50 minutes to cause the condensation reaction to proceed. The condenser is then disconnected and a vacuum applied while holding the temperature at the same point, to vaporize the water and the excess of formaldehyde.

The initial condensation product thus obtained is then transferred to an enamelled open kettle and heated at 100°C. in the open air until, when a sample is cooled to room temperature, it will become solid. This condition can be ascertained by testing a drop of the mixture on a glass slide. The material is then dissolved in benzene etc. and used for impregnating paper, fabric, etc., that is to be made up into laminated molded products and the like.

Some Modifications

The inventor states that the "tox tungate," which consists of a mixture of lead and manganese resinates and tungates (salts of the fatty acids contained in China wood oil) takes the place of the usual catalyst in making the new condensation product.

The more important patents and innovations in the cellulose ester field will be reviewed in the November issue of *Plastics*.

The second patent, U. S. P. 1,640,562, Aug. 30, 1927, relates to a varnish made from a similar condensation product. The inventor refers to one of his earlier patents 1,212,738, Jan. 16, 1917, in which a liquid coating composition of a condensation product of phenol, formaldehyde, a drying oil and a drier for the same was described.

In practicing the present invention however, Brown combines cresol, China wood oil, trioxymethylene and a dryer such as lead-manganese tungate or cobalt linoleate; the mixture being heated to 100 to 110°C. for about 100 minutes, preferably in a reflux apparatus. The resulting liquid is then heated to 120°C. until it clears, a change due to loss of water from the reacting mixture. The drier is then added and the mixture heated to 200°C. until it exhibits the desired viscosity. The product, thinned with a suitable solvent, is used as a varnish which is capable of induration by baking.

Dr. Baekeland Still Active in Research

Leo. H. Baekeland inventor of Bakelite, is still actively engaged in finding new methods and applications for the phenol resin that has built for him everlasting fame. On an application filed in 1922, and assigned to the Bakelite Corp., a patent issued Aug. 2, 1927, U. S. P. 1,637,512; for a resinous condensation product made from dihydroxydiphenylethane and reactive methylene bodies.

The raw material for this condensation product is dihydroxydiphenylethane $CH_3CH(C_6R_4OH)_2$, also called para-diphenylolethane or ethylidenediphenol 1,1. The substance is described in Beilstein, Handbuch der Organischen Chemie, Vol. II, 1896, p. 994.

Dihydroxydiphenylethane Used as Starting Point

By combining this material with paraform, hexamethylenetetramine or their equivalents, new resinous condensation products of commercial value are obtained. For example, 100 parts of the dihydroxydiphenylethane are heated with ten parts of paraform, first at about 180°C and later at about 200°C until a transparent, fusible resinous mass is obtained, which solidifies on cooling to a brittle resin, usually of a light brown color, soluble in acetone and other solvents. The general properties of the product are analogous to those of Novolak. The products are capable of hardening by using more of the aldehyde materials, such as the paraform.

(*Continued on page 545*)

The Manufacture of Casein Solids

IX. The induration and insolubilization of the molded casein articles is a vital step in manufacture.

By Heinrich Prehn

Consulting Engineer; German Correspondent of Plastics

The first eight numbers of PLASTICS for 1927 have each carried a part of the highly interesting and authoritative treatise on the details of the manufacture of the casein solids by Mr. Prehn, who is one of the leading plastics technologists in Germany.

No doubt our readers have noticed that in this series of articles, manufacturing details, mechanical equipment, technical difficulties and short cuts for solving them have been disclosed more fully than in any other articles on this subject of which we are aware.

Unforseen contingencies prevented the publication of an article in the September issue, and the present article is a continuation from page 395 of our August issue.

THE seven previous articles in the present series on the Manufacture of Casein Solids have taken up, in profuse detail, the various steps incidental to the pressing, shaping and working of the casein and the admixed colors and fillers, through to the final production of sheets, rods and tubes.

However, there is a very important step about to be described. This concerns the hardening and insolubilization of the casein by means of tanning agents such as formaldehyde. The proper carrying out of this step is absolutely essential, and forms one of the most precarious phases of the manufacture. Proper control, and proper conditions—coupled with scientific knowledge, are an essential prerequisite for the successful manufacture of casein solids.

CASEIN solids, in the stage described in the previous articles, require a treatment with formaldehyde to render them insoluble. Experience has shown that if the casein solids were simply dried, without this treatment, they would be practically useless, as they would not be resistant to moisture.

Not much is known definitely regarding the specific action of formaldehyde upon rennet casein. The latter already exists in a coagulated, insoluble form, and just what the formaldehyde further contributes remains a fertile field for discussion. The practical features of the process, however, and the conditions for successful induration, have been definitely ascertained.

Hardening

The hardening, or induration, of casein solids is a process requiring considerable time and comparatively large installations, so that quite some capital is required for this part of the plant. Many attempts have therefore been made to hasten and shorten this process, and such modifications will be taken up later in the present series of articles.

The essential features of the induration of casein solids comprise the steeping of the plates, tubes, etc., in a bath containing formaldehyde of a given concentration, and under controlled conditions of temperature. The action begins on the surface of the articles and gradually pro-

A typical, well arranged indurating plant for the insolubilization and hardening of casein.

gresses through to the center.

The time required for induration depends upon the moisture content of the material being treated; upon the concentration of the formaldehyde solution; the thickness of the objects (plates, tubes, rods, etc.) and upon the temperature.

If the moisture content of the casein material to be treated is fairly high, Technical Engineer Mr. Stitch suggests, according to an article by him in "Kunststoffe," a slight preliminary drying prior to induration, as this makes it possible to control more closely the correct concentration of the hardening solution and the time element required for complete induration. I, however, on the contrary, do not agree with this suggestion, and do not recommend it, as the difficulties it may lead to are entirely incommensurate with the alleged advantages.

Concentration

Obviously, the concentration of the formaldehyde solution should be kept quite constant, and this is readily controlled by means of an hydrometer, graduated from sp. gr. 1,000 to 2,000, or from 0 to 70° Beaumé. A table can readily be calculated giving the percentage of formaldehyde in such a solution. This control of the strength of the hardening bath should be conscientiously carried out, as success depends largely upon it; and irregularities in the solution may lead to brittle and useless casein solids, with resulting large manufacturing losses.

Time

It should also be remembered that the formaldehyde solution must not be too strong. Merely strengthening the solution does not shorten the process, as might be expected, but leads to difficulties. A definite time is required for the penetration of the casein solids by the hardening solution, and the strength of the solution is a vital factor in the phenomenon. Furthermore, a needlessly strong solution also loses formaldehyde by evaporation, and is thus a source of expense.

The duration of the hardening depends upon the thickness of the material treated, but is *not* in direct proportion to the thickness. This is important to remember. Whereas a casein solids plate, 2 mm. in thickness, will be hardened in from 3 to 4 days, a plate twice as thick requires at least 10 days. A rod three times as thick as another, as for example one that is 12 mm. in diameter, does not require merely three times as long as one 4 mm. in diameter, but from 5 to 6 times as long. The duration of hardening varies in accordance with the ratio of *surface* to *volume*, so that the time will be longer with rods than with plates and tubes. When once the proper hardening times for the various agencies manufactured have been determined, it is best to work out a table for future guidance.

There are several tests to determine the proper point of hardening for casein solids. Experienced operators are usually able to judge this by the ease or difficulty with which the material cuts, and the appearance of the cut.

Temperature Important

The temperature of the hardening bath also plays quite a part. In countries with a moderate climate, differing from winter to summer, it will be found that the hardening takes place more rapidly in the warm season. It is not necessary, however, to heat the hardening department in the winter time unless the rigor of the climate

(*Continued from page 539*)

New Semi-Automatic Press

IT has been our custom, as indicative of the trend of progress, to call to the attention of the readers of PLASTICS, any meritorious improvements made from time to time by the makers of the mechanical equipment forming so important a branch of the plastic molding art.

Fig. 1. New Hydraulic Press.

Usually such improvements are in the form of patents, but it is almost a foregone conclusion that the details in the highly technical language of a patent specification for a complicated machine like a hydraulic molding press, would hardly make palatable reading, although the apparatus may be in itself very interesting.

It is mainly for this reason that we prefer to describe such apparatus in the words of the men who have given their time and energies to its invention and perfection.

Features

Among some of the recently introduced presses is one that has been brought out by the Watson-Stillman Co., and illustrated in Fig. 1. The manufacturer states that this press has been designed to eliminate recurring mold costs by incorporating several features in its construction that ordinarily have to be a part of each mold used, thus making it more adaptable to all classes of molds. These features not only save in mold cost but speed up and increase production.

The operating and mechani-

(*Continued on page 544*)

Tooth Brush Manufacture Consumes Large Amounts of Pyroxylin Plastics

Development of special machinery enables economies in fabrication to be realized

By A. Bahls

Based on articles by the author in the German publication Kunststoffe

THE tremendous number of tooth brushes sold annually, places them among the most utilitarian of articles, and with very few exceptions some form of pyroxylin plastic material is employed for their handles, only the very cheapest brushes having wooden handles.

In making the brushes, the plastic material, which is supplied in the form of sheets or plates, is first cut into strips which correspond in width to the extreme length of the brush to be manufactured. This cutting is accomplished either with a small circular saw, or still better by means of shears similar to a paper cutter, and illustrated in Fig. 1. Such a cutter is very much to be preferred to a saw, as the latter not only causes a

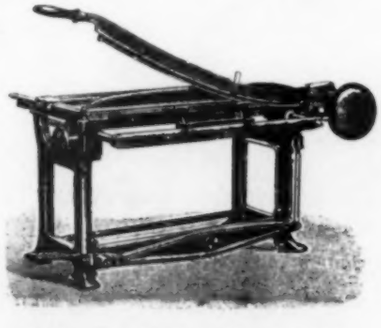


Fig. 1. Pyroxylin plastic cutting shears.

loss in material on account of the pyroxylin dust produced, but it is also the cause of a great fire hazard as the saw will heat up the plastic material, and it is conceivable that the heat developed when the saw binds may be sufficient to set the sheet afire, a difficulty which can only be obviated by having a stream of water play on the pyroxylin during the cutting.

For mass production, special cutting machines are preferable. The wide strip is now cut up into individual narrow pieces roughly approximating the shape of the brush, and preferably in such a way that as little of the material will be wasted. If the brush handles taper toward the end, the cuttings are taken on the bias, so that the pieces will lie in opposite directions. For this purpose a small circular saw may be used, but here again a cutting machine is highly preferable as it will make cleaner work and be less hazardous. Special forms of cutting machines, which automatically push the strip forward as pieces are cut off save a great deal of time, and are essential for mass production.

The Second Stop

The strips produced by the cutting operations just described are then further shaped on a cutting or beading machine so as to give the brush handles the desired configuration. An outfit suitable for this purpose is shown in figure 2. The pyroxylin strip is retained by a holder while the cutting knife does its work. A separate knife is used for giving the shape to the brush-end of the tooth-brushes.

After the general shape has been given to the brush handles, they are polished. When bone was still the chief material for making these articles, this operation was carried out in a tumbling barrel, but more modern practice is to employ a special form of polishing machine. The simplest form of this consists of a piece of shafting running in suitable bearings, and having fabric wheels at both ends. One of these polishing wheels consists of nothing more than a large number of heavy linen discs which are sewed together at the center and are revolved at high speed by the turning of the shaft. The rapid movement throws out the individual fabric discs so that they constitute a buffing wheel. One set of these discs is usually made of canvas or linen, and the other of felt cloth.

Fig. 2. Shaper.

The canvas discs are used for the preliminary polishing and the felt discs for the final polishing, which is usually done after the bristles have been set. The preliminary polishing re-

How the Japanese Do It!

See page 530 of the present issue for a description of modern Japanese conditions and their probable effect on the pyroxylin industries of Japan.

quires quite a little skill, as too much heating of the pyroxylin material must be carefully avoided.

Setting the Bristles

Before the bristles can be properly placed, it is necessary to drill the holes which are to contain the individual bundles of bristles. This is done on a special drilling or boring machine which places all of the holes into the head of the brush at one time, and also drills these holes to a uniform depth.

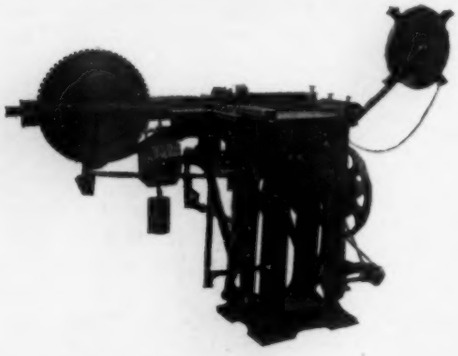


Fig. 3. Machine for automatic drilling of holes and setting bristles.

The next important step in the production of the tooth brush consists in the placing of the bunches of bristles into the holes provided in the manner already explained. A special machine performs this operation. In one method, the bunches of bristles are bent over at the bottom, and, if the machine works on the principle of wire-set brushes, a thin wire is passed around the bristles thus bent, after which the bristles are seized by the machine and forced into the holes. The wiring process is generally restricted to larger and coarser brushes, the finer brushes being made by a different method, as follows.

The "Anchor" System

For tooth brushes, for example, a so-called "anchor" system is employed for setting the bristles. In this method, a thin iron ribbon is cut into a small piece, practically square in shape, and of a size which will just about fit into the hole that is to receive the bunch of bristles. A suitable plunger seizes the bristles and this small piece of iron and forces both of them into the hole, so that the lower end of the bristles is held by the little iron plate, which because of the shape becomes anchored in the hole, and the bristles are thus prevented from being pulled out again except by the use of considerable force.

For large scale production automatic drilling and bristle-setting machines are employed, as shown in fig. 3. These machines are fed with bristles on one side and the drilled brush-handles on the other.

The next step consists in cutting off the bristles so as to give the brush the desired shape. This is done on shearing machines (see Fig. 4). Some brushes are cut with the bristles all of the same the bristles all of the length, but in many cases the bristles are given definite shapes and configurations, (as for example the so-called "Prophylactic" brushes, and those designed to reach every part of the tooth). The machines which do this have either rotating or reciprocating knives, are fairly

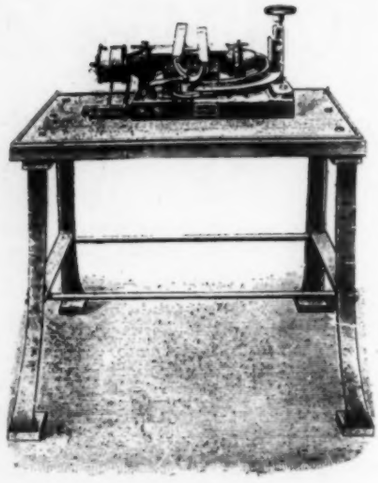


Fig. 4. Shearing machine for trimming bristles.

small and usually belt-driven.

Most tooth brushes are also provided with a name or trade-mark stamp, which is accomplished in quite the orthodox manner, and, in the case of pyroxylin tooth brush handles, by a slight warming of the side which is to be stamped with the desired mark.

Polishing

The final touches are given to the brushes by a polishing operation. Here the same type of rapidly rotating fabric polishing wheels are used; except that in this case considerable experience on the part of

(*Continued on page 544*)

Making Baby's Rattle

THE Celluloid Industrie Supplement of the German Gummi-Zeitung, 1927, 41, p. 1659-1660, gives a concise account of the various steps in the fabrication of pyroxylin plastic or Zyl rattles and similar toys.

The principal process employed is that of blowing thin zyl sheets into globular form by means of steam, while the sheets are contained in a suitably shaped mold. The mold is given a large number of powerful impulses by being rapped on its upper part by an eccentric wheel so as to force the overlapping portions of the two zyl sheets, that are employed in making the rattle, to become firmly welded to each other. The internal pressure of the steam applied assures a faithful reproduction of the ornamentation on the mold surfaces.

The handles of the rattles are made separately and are usually attached to the globular part by means of a zyl cement, or a solvent such as acetone which renders the material adhesive.

A second method is the formation of zyl balls by the usual drawing method, in which the two hemispheres of the ball are made separately and are then cemented together. Special apparatus is required to assure a smooth and virtually invisible joint.

Cellulose Acetate Impregnated Paper

Mixing comminuted cellulose esters with rag fibers during pulping operation in paper manufacture, followed by use of a solvent to distribute the ester, forms the basis for novel process

THE use of cellulose acetate to harden and waterproof a paper product, by actually mixing the undissolved cellulose acetate with the paper stock, forming the paper, and afterwards treating the product with a cellulose acetate solvent to cause the same to penetrate all the fibre of the product is very interestingly described by the inventor, James McIntosh, in a patent granted him in the United States on June 7, 1927, (U. S. P. 1,631,750; assigned to Diamond State Fibre Co.) As the process differs considerably from the older impregnating processes, and as a product such as this should find some valuable applications in insulation, panel and similar work, we quote from the application, letting Mr. McIntosh tell the story in his own words.

THE inventor, James McIntosh, claims that the new material can be used for making gears, pulleys, electrical insulators, switchboards, veneer, radio panels and similar articles. The paper is thermoplastic.

Impregnation Automatic

"I have found that if a celulose ester is added to the pulp or rag fibres during processing, that treatment under heat and pressure subsequent to the completion of the paper will give a product resembling that made by impregnation. My process gives a product in which the cellulose ester is intimately and uniformly dispersed throughout the fibres as well as upon the surface, resulting in a more water-proof and more durable product than has previously been possible by impregnation. A further advantage of my process resides in the elimination of one step in the process, to wit, that of impregnation.

The term "cellulose ester" embraces that class of compounds which are formed by the action of acids on cellulose, and includes the cellulose acetates and cellulose nitrates, but due to the non-inflammable nature of the former, I prefer to use that compound.

In carrying out my process, I add the solid ester to the pulp and rag fibres in the beater together with the filling, sizing and dyeing compounds. The action of the beater comminutes the cellulose ester and uniformly disperses it throughout the mass. The percentage of the cellulose compound added depends upon the properties desired in the finished product. A relatively low percentage, is that from 10 to 15% (based on the finished product), will give a paper product after treatment, as hereinafter described which will be somewhat flexible, while a product containing about 50% of the cellulose ester will resemble vulcanized fibre and will be hard, compact and mechanically strong.

Usual Paper Making Methods Employed

The paper is processed in the usual manner, since the presence of the ester has no effect on the materials entering into the paper nor on the mechanical operations. After the paper leaves the Fourdrinier machine, it is ready to be vulcanized, that is to be subjected to heat and pressure. The single sheets, if they are of the desired thickness, are vulcanized per se, or a laminated product is built up by superimposing one sheet upon another until the requisite thickness is obtained. In either case, the heat and pressure step is accomplished in the same manner.

Pressing

The sheets are placed between the heated platen of a suitable press whereby they are subjected to a pressure such as one thousand pounds per square inch at a temperature of one hundred and twenty-five pounds of steam. This heat and pressure are maintained for a time sufficient to cause the cellulose ester to fuse throughout the fibrous mass and to flow completely over the surface, forming a continuous coating. If the platens are highly polished, there will result a smooth, uniform and highly polished coating of the ester on the surface of the fibrous material. The cellulose ester binds the sheets into a compact inseparable body.

Parchmentizing

The paper sheets containing the cellulose acetate after they leave the Fourdrinier machine may be parchmentized in the usual manner, in which case, for example, the sheets may be passed through a bath of 70-72° Baumé zinc chloride at a temperature of 100 to 125° F. whereupon the paper sheets will be changed to a vegetable parchment membrane and may be, if desired, superimposed to obtain the required thickness. The parchmentizing agent is

(*Continued on page 548*)

Economic Conditions in Japan May Affect Pyroxylin Plastic Industries

Remarkable increase in automatic equipment in Nipponese factories reported by recent observer

By Paul Buhrle

from Die Celluloid Industrie, 1927, 41, 160

THE general belief that Japan, by reason of its cheap labor, is able to compete actively on the world markets, is no longer properly justified. As a result of the unnaturally rapid industrial development subsequent to the World War, conditions have changed so completely that visitors to Japan, who have seen the country before the war, are astounded at the tremendous changes that have taken place.

Effect of the War

The cost of food products and domestic requirements, even of articles that are made within the country, is so high that the duty on imported goods had to be raised again in 1926, as any European firm could easily undersell local Japanese producers, despite the tariff on foreign products. Wages have also increased to a point unheard of in the orient in the past. A girl operator in a factory will now earn as much as 50 cents a day; unskilled laborers get up to 75 cents; and skilled workers from 1 to 2 dollars per day. These figures are extremely high as contrasted with the average wages before the war.

It will be impossible to reduce these wages, as the cost of living has increased even more, so that at present a laborer earning 45 yen (about $22.50) per month can hardly keep himself and family alive, as the rent, even for small and inconvenient dwellings amounts to about one-half of his income. The money lavished by the Japanese government on its army and navy is simply enormous in comparison with the money expended by the populace on food; and money spent for clothing is three times that spent on food. This readily accounts for the markedly lowered productive capacity of the Japanese workers. Furthermore the summers are extremely hot, and the winters very cold; while in most of the industrial establishments there is no provision for heating the factories in the winter time. Taxes are at a maximum and place a terrific burden on the population.

So far-reaching are some of the author's statements, that a consultation with responsible authorities in this field was felt advisable. The consensus of opinion was, that while efforts to modernize the industry are being energetically pushed, there is still a good deal of fabricating work done in Japanese homes. Statements as to the alleged wholesale scrapping of imported machinery of American and European origin, should be accepted with caution, as in the design of automatic machinery America is preeminent. Furthermore, the prime factor in the cost of tooth brush production is not labor—still undoubtedly comparatively cheap in Japan—but the cost of the raw materials. In any case, in weighing the statements with regard to the output of Japanese brush making machines, the generally greater length of the Japanese working day should be taken into account. So that an accurate estimate of the situation calls for further enlightenment.

Any one at all familiar with the situation will be astounded to find that notwithstanding all this, Japan is still able to export her goods, despite the fact that she imports more than she exports; and will find it difficult to understand what it is that is causing the constant rise in exchange rate on the yen.

Whole Industries Wiped Out

One important factor is the export of raw silk, amounting to about 500 million dollars per year, and of this the United States takes over 60 per cent. The United States has been treated by the Japanese customs authorities as a "favored nation" and this enables America to export machinery and other necessities to Japan with great advantage. However, as soon as the European industrial condition became better, and European products again became available in Japan, a great many Japanese firms were forced to suspend operations, causing great unemployment.

Entire industries were wiped out, and there is no prospect of reviving them in the future. About two million workers were compelled to return to the agricultural districts from the cities, and now make a precarious living off the soil and the silkworm-raising industries. Be-

(*Continued on page 534*)

Japanese Conditions

(*Continued from page 530*)

sides this, the increase in population in Japan is alarmingly large, and as the Japanese industry was evidently slated for destruction, the country's statesmen have adopted a relief program that promises well, and that has permitted Japanese producers to export goods at a profit. However, this condition is purely artificial, and can only be maintained by legislative assistance.

Governmental Aid

The program adopted was the artificial governmental formation of trusts and the adoption of American efficiency and production methods. It is expected that when once the entire industry of the Empire has been placed on a truly efficient basis that conditions will become normal once more.

This has had a remarkable effect on the Japanese pyroxylin industry, which now is in the hands of a trust known as the Dai-Nippon Celluloid Co., Ltd., with headquarters at Sackai-Osaka, Japan. This trust exerts a powerful influence on the camphor monopoly. A research and development laboratory was also founded to study each and every manufacturing and fabricating operation witha view to cutting down the overhead expenses, to simplify procedure, and to speed up production. The effect has been remarkable.

Results of Specialization

Various plants were compelled to specialize in one particular line. Plant engineers are engaged in the study of flow sheets, methods of working, automatic machinery and means for economically handling and routing materials. Makers of dies and machinery, engineers, fine mechanics, designers, modelers, engravers and chasers, and other important operators work hand in hand to increase efficiency. This cooperation has led to surprising results.

Just a few of the pyroxylin plastic fabrication industries that have been aided by this program will be mentioned, but the situation is typical of what is transpiring.

In the production of pyroxylin plastic tooth brushes, for example, Japanese engineers have designed and constructed a forming and cutting machine that turns out 4,000 brushes per day per machine. A bristle-setting machine that finishes 2,400 brushes per day is another achievement, only one female operator, at 50 cents per day, being required to supervise its production. Drilling machines that form all the necessary holes in six brushes at a time have been developed. Its capacity is 6,000 brushes per day per operator. Cutting machines for blanking out the stock produce 10,000 brush parts per day per single operator. The net result of this industrialization of what was formerly a manual industry is the daily out-put of millions upon millions of good pyroxylin tooth brushes that can be sent to the four corners of the earth at prices so low that no European or American manufacturer can even hope to compete.

In the Toy Field

Blown pyroxylin plastic toys are another branch in which the Japanese efficiency engineers have worked veritable wonders. For example, machines have been developed that allow a single operator to blow 300 finished toys per day, of fairly complicated outline. Automatic cooling and heating prevent even unskilled operators from ruining the machines, as would be the case withthe old-fashioned devices that are still in use in many non-Japanese work shops.

In the processes of shaping and drawing pyroxylin plastics under hot water, many new methods have been introduced. Automatic and semi-automatic machinery has been installed producing finished articles, such as toiletware, in dies and "shapes," that remind one of the die-casting methods used in the mass casting of metallic articles.

The production of pyroxylin plastic collars, cuffs,etc, is also on the increase in Japan.

Scrapping Good Machinery

One thing that impressed the writer on a recent visit to Japan was a plant that works up old iron, in other words a junk yard. Here were piles of pyroxylin plastic working machinery imported only a few years ago from Europe and the United States, still almost brand new, and in some cases actually unused. It had been discarded for the new modern automatic machinery designed by the Japanese themselves. Industrial trade schools, that turn out highly skilled mechanics and engineers are part of Japanese cultural life today, and the present generation growing up is practically all highly skilled and educated. Almost every workman that can afford the time is attending night school to train himself in some special branch. The total effect of this on future industrial conditions in the Far East must not be underestimated.

Scientific Efficiency

It is quite evident that Japan is stealing a march on the white peoples, and is using its head in scientifically working out the salvation of its population. While Japan is naturally short of many important raw materials, it is solving the problem by efficiency measures that will assure it of a dominating place in industrial operations in the East.

Try Celoron Molding Powder at Our Expense

A sample quantity of Celoron Molding Powder for testing in your own molds, will be sent free on request. Write for yours today and ask us for quotations.

Let Your Products Prove Its Quality
Let Your Plant Prove Its Economy

CELORON Molding Powder—produced after years of experiment and study of the characteristics of the ideal molding powder—is now offered to the public.

If we did not consider this molding powder a long step forward toward better quality of finished product and greater economy in production, it never would have been put on the market.

But we don't want you to be guided by our tests. We want you to convince yourself. Test a sample quantity of Celoron in your own plant under your own operating conditions. Compare it side by side with other molding powder. If it does not do your job at least as well as the molding powder you are now using, you will not be asked to buy.

THE CELORON COMPANY, Bridgeport, Pennsylvania
Division of Diamond State Fibre Company In Canada: 350 Eastern Avenue, Toronto

CELORON
MOLDING PRODUCTS
Molding Powders—Impregnated Fabrics and Paper

EDITORIAL · IMPRESSIONS

Patents a Real Index of Progress

THE past few months have been quite active in the phenol resin and allied arts.

A number of interesting processes have been described, and, as has become the uniform custom, have been protected by patents. In fact, it is very difficult to persuade any one to mention, much less describe any advance that he has made in molding methods until the patent has issued, and his process thus propertly protected.

The American System

The beneficent effect of the American patent system, that grants an inventor a seventeen years' monopoly for his ideas in exchange for full publicity, is very strikingly shown by the tremendous advances made by the United States mechanically and materially. In fact, it is safe to say that the civilization of any country can accurately be measured by the number of patents granted.

The leading nations of the world, as England, France, Germany, Italy, Japan and the Scandinavian Countries, are the most active in the patent field; but none of them reach the number of patents annually issued from the patent office in Washington.

Another important difference between the American patent system and those abroad, is that in this country the inventor is held much more closely to a full and complete description than he is in other countries. Merely nebulous ideas will not suffice for the grant of a valid U. S. patent.

They Come in Bunches

It is for this reason, that PLASTICS so often contains descriptions of processes taken from recently issued patents, as in their specifications is reflected the true progress of the art in which we are all interested.

If in presenting these methods and articles there may appear a semblance of prejudice toward one or another branch of the plastic materials' industry, this may be attributed to the activity of certain arts at certain times.

Partly this is the result of vacation time in the Patent Office. Quite often a certain division, and certain individuals in it, have charge of definite types of inventions, and while they are away some applications are kept pending, later to issue almost simultaneously.

Inasmuch as PLASTICS endeavors to keep strictly up to date, and to review the patents as fast as they issue, it occasionally happens that some particular line is more strongly represented in one issue than in another.

However, we feel the utmost confidence in all of the materials at present offered to the trade from the time-honored pyroxylin or Zyl plastics to the most recent products of the rubber chemists and synthetic resin research workers.

* * * * *

Progress in Synthetic Resins

EVER since the expiration of some of the basic synthetic patents late last year, the arrival of new resinoid plastics has been almost a daily occurence here.

Where five years ago perhaps, only one form of commercial phenol resinoid molding material was known in the United States, there are at present at least eight concerns actively engaged in the production of such products.

Needless to say, competition is keen and active. Prices are gradually being reduced to the "irreducible minimum", and it is quite probable that the bottom has now been reached. Competition now may take another turn, and will have, perforce, to be based upon quality and service to the molder and ultimate consumer.

In this respect, the development of light colored molding powders, and the production of more resistant and less fragile products, is the line of development most in evidence. In Great Britain, some very excellent and artistic results have been achieved in the production of molded articles such as dishes, vases and ornamental pieces in variegated colors. Furthermore, the modern molding powders, as contrasted to those of five years ago, are by no means limited to the phenol resins. Carbamide-formaldehyde condensation products, sulfur-phenol resins, furfural resins, acetone resins, styrol condensation products, molding powders from latex, from casein and rubber, and even from casein phenol and formaldehyde, have made their appearance; while the workers with the polymerizable natural oils, as tung oil, perilla oil and the like, have also contributed to the remarkable crop of new materials.

Seldom has there been an industry that shows such remarkable growth, both commercially as well as technically, as that of the plastic materials.

It is almost a foregone conclusion that the molding of plastic materials will eventually be an industry of tremendous scope, and that this method of producing the innumerable intricately shaped parts required in the complex modern mechanicalized industries will su-

persede to a very large degree, the older methods that involve machining and cutting.

The saving of time and the prevention of waste, are among the chief aims of modern industrial developments. Molding accomplishes both these objects to a remarkable degree. Surely prosperity cannot fail to come, for in the molding industry there is that happy union of the scientific with the practical that spells success.

* * *

Domestic Development

FOR many years, as far as the United States was concerned, the only practical cellulose plastic was that based on cellulose nitrate. The inherent ready inflammability was lessened by the incorporation of various flame-retarders and fire-proofing substances, so that for many purposes the pyroxylin plastics were perfectly suitable, achieving remarkable fame and very widespread use.

In Europe, on the contrary, the attempts to introduce the less inflammable cellulose ester plastics met with better success; and many of the French products were mixtures of casein with pyroxylin, or were plastics based on organic cellulose esters such as cellulose acetate.

In the United States, cellulose acetate only became popular in the form of artificial silk. The work of the Dreyfus Brothers, already referred to many times in PLASTICS, has made it possible to produce commercially practicable cellulose acetate plastics analogous to the pyroxylin materials as well as molding powders. The formation of the Celluloid Corporation, which grew out of an amalgamation of the Celanese Corporation and the Celluloid Company, is the first active step taken by large producers of plastic materials to commercialize the organic cellulose esters.

It seems reasonable, therefore, to assume, that for certain applications the time-honored pyroxylin plastics may have to face active competition from their cellulose acetate analogues.

Button Men's Association Takes Form

THE Vegetable Ivory Industries' Association, recently organized here, announced its roster recently. An officer of the association said that, since being organized, button manufacturers are showing a more cooperative spirit.

Firms that have joined the organization are: Warsaw Button Co., Warsaw, N. Y.; York Button Co., Philadelphia; North American Button Co., Philadelphia; Gainway Button Co., New Brunswick, N. J.; Rochester Button Co., Rochester and Newark; Alliance Button Co., Newark; Federal Button Co., Newark; Cooperative Button Co., Newark; Waterbury Button Co., Waterbury, Conn.; Associated Button Co., Newark; New England Button Co., Newark; Button Machinery Co., Hoboken, and the nut brokerage firms of Pablo Calveta & Co., Snyder & Wheeler, and Whitehouse Davis & Co., all of New York.

Farrel Co. in Merger

THE Farrel Foundry and Machine Company of Ansonia, Conn., merged with the Birmingham Iron Foundry, Derby, Conn., September 20th. Meetings of the shareholders in the two companies voted unanimously in favor of the combination to be known as the Farrel-Birmingham Company. Mr. Charles F. Bliss, president of the Ansonia organization was elected to the same office in the new company, capitalized at $5,700,000. Other officers will be: Vice presidents, F. D. Wanning, Walter Perry, Franklin Farrell, Jr.; secretary, George C. Bryant. Originating from very small beginnings in 1848 and 1836 respectively, both companies have been pioneers.

Mr. Ralph W. Wales

Mr. Ralph W. Wales for 15 years manager of the Colasta Co. is now general manager of the synthetic resin department of Lubricant Laboratories, Everett, Mass.

The Manufacture of Casein Solids

(*Continued from page 526*)

is such that indoor temperatures below plus 5 degrees Centigrade (about 40°F) are to be feared, as below this point the hardening is inhibited unduly. Freezing, obviously, would be highly undesirable in this process.

Concrete Tanks Give Best Results

The formaldehyde solution is usually contained in brick vats, iron troughs, or in concrete tanks, the latter being found particularly desirable. A rather rich mixture of cement should be used so as to form a tank that is hard and quite impervious. The size and shape of the tank are not very important. Their location, and the general layout of the plant should be the determining factors in the selection of dimensions. The construction of two hardening tanks with but one dividing wall is the most economical, as one wall is saved thereby. The passages between the tanks should be wide enough for comfortable handling of the materials. If there are no passages between the tanks, they can be served by board walks built across them, although the first-mentioned arrangement is preferable. Where floor space is valuable, the tanks can be made twice as deep, although this makes handling somewhat more of a problem.

Keeping Up the Strength of the Bath

The losses of formaldehyde by evaporation may be quite considerable, unless the precaution is taken to provide the hardening tanks with wooden covers. These are best made in sections so that only a relatively small part of the tank is open to the air at any one time. This also serves to keep out dust and dirt. Some losses are also possible through leakage of the tanks, or by undue porosity of the concrete from which they are made. In such cases it is advisable to give the tanks a coating of sodium silicate solution on the inside. Wherever pipes, etc., enter, proper packing material must be provided to prevent leakage.

Arrangement of the Workroom

Figure 16 shows a typical formaldehyde-bath workroom that is arranged sensibly and conveniently. However, even the arrangement shown is subject to improvement. To insure that the material undergoing treatment will be subjected to a solution of unvarying strenth, it is essential that the latter be circulated from tank to tank continuously. For this reason the hardening tanks are connected by means of pipes, and the solution is circulated through a series of tanks by a suitable pump. The level in all the tanks should therefore be the same, and should be amply sufficient to insure complete immersion of the articles being indurated. If this precaution is not taken, the articles will show fissures and weak spots. The tanks from which the pump takes its supply must not be used for hardening, as the level in this tank is subject to some variation. It is usual practice, therefore, to make this feed tank somewhat smaller than the treating tanks.

A further precaution that is quite essential, is to have separate treating tanks and circulating systems for transparent, light colored or white goods, so as to prevent the transfer of coloring matter from colored goods to the white articles. Even though such coloring matters only penetrate a short distance, their removal means extra work later on, and therefore such contamination of the material is best entirely avoided. In large plants, a number of complete units are employed for each series of colors, ranging from white to dark or black.

Sanitary Precautions

For sanitary reasons it is essential that the rooms in which the hardening tanks are set up be very high and exceptionally well ventiliated, as the formaldehyde vapors are not particularly healthful. The hands of the workmen should be protected from contact with the solution by means of rubber gloves. The aisles between the tanks should be wide enough, if space will permit, to admit carts or carrying trucks for the plates and rods, etc. An I-beam, with a travelling hoist, either hand or pneumatic, for raising and lowering the racks holding the articles being treated, is a very great convenience, and should be provided if the installation is at all large.

The racks and holders used for keeping the materials in the solution differ very radically

(*Continued on page 543*)

TECHNICAL ABSTRACTS
AND PATENT REVIEW

Transparent Sealing Wax or Plastic. Joseph Prikelmayer, Valjevo, Yugoslavia. U. S. P. 1,638,960; Aug. 16, 1927.

A transparent thermoplastic material suitable for molding, for sealing wax, and for similar bonding purposes consists of a mixture of 36 parts of natural orange shellac, 24 parts Venetian turpentine, 6 parts water-white colophony, and 3 parts of mastic resin. It may be applied over a written signature as an added protection against tampering.

Stencil sheet containing plasticized cellulose acetate. Alex B. Davis, assignor to A. B. Dick Co., Chicago, Ill. U. S. P. 1,639,080; Aug. 16, 1927.

A stencil sheet for mimeograph work etc. is made from fine Japanese Yoshino paper impregnated with acetone soluble cellulose acetate that his received an addition of **mono-benzoyl butyl tartrate as a plasticizer.** This is said to be a new product, in the form of an oil, and an excellent plasticizer for the cellulose esters. Other materials are also added, a typical formula being:

Cellulose acetate, dry basis	225 parts
Acetone	4,000 parts
Zinc oxide ground in monobenzoylbutyl tartrate 50:50 by weight	300 parts
Monobenzoylbutyl tartrate	1125 parts
Diamyl phthalate	375 parts
Chlorinated naphthalene	225 parts
Castor oil	60 parts

Starch acetate may replace the cellulose acetate. The stencils are said to be far in advance of any type thus far produced. (It would appear that such mixtures have other possibilities, Ed.)

Acceleration of gelatinization of cellulose nitrate. Robert C. Moran, assignor to E. I. DuPont de Nemours & Co., Wilmington Del. U. S. P. 1,640,-712; Aug. 30, 1927.

The present invention relates primarily to high explosives made from cellulose nitrate and nitroglycerol. An alcohol, preferably one having two hydroxyl groups, is used to accelerate the gelatinzation of the cellulose nitrate in the nitroglycerol, so as to produce a blasting gelatin. The lower glycols are preferred as the accelerating media.

Nitration process and nitrating acid mixture. Guy B. Taylor and Albert S. Richarson, assignor to E. I. Du Pont de Nemours & Co., U. S. P.1,-640,737; Aug. 30, 1927.

The nitrogen oxides produced by the oxidation of ammonia are employed for making a nitrating mixture by dissolving them in strong sulfuric acid. The reaction is as follows:

$$2\ NO_2 + H_2SO_4 = HNOSO_4 + HNO_3$$

The presence of the nitroso-sulfuric acid is said not to affect the nitrating properties of the mixture. Benzene and glycerol have been successfully nitrated with the new mixture. The spent acid is recovered by heating to drive out the nitrogen oxides which are dissolved in fresh strong sulfuric acid, so that the process is cyclic. Nothing definite is stated regarding the availability of the new nitrating mixture for the production of pyroxylin or cellulose nitrates.

Water-waving comb. Philip B. Watson, assignor to Standard Pyroxoloid Corp., Leominster. Mass. U. S. P. 1,-635 065.; July 5, 1927.

The device comprises two curved comb-like parts adapted to be placed with their teeth projecting toward each other at a distance apart, and a pair parallel elastics permanently connecting the ends of both and of such length as to normally force the two pieces together with the teeth of each one extending into the spaces between the teeth of the other. In use the elastics are stretched. the hair engaged, and the combs allowed to approach each other.

Molded Articles from Rubber Latex. Chauncey C. Loomis and Horace E. Stump, assignors to The Hevea Corp.. New York. U. S. P. 1,634,-293; July 5, 1927.

The process of molding articles, comprising, forming a suspension of a filler, adding latex, partially coagulating the latex, removing the liquid content, drying and pressing Details will be published later.

Waterproof cementing composition comprising blood albumen, gelatin and hexamethylenetetramine. Gustave F. Dreher, assignor to General Electric Co., Schenectady, N. Y. U. S. P. 1,631,671; June 7, 1927.

While this patent relates primarily to a superior form of cement or glue suitable for making very strongly bonded ply-wood or ply-board, the new materials would appear to have qualities which should make it suitable for bonding fillers, and thus allow of its use in plastics. The preferred mixture consists of 62 lbs. blood albumen, 16 lbs. gelatin. these ingredients being separately dissolved in water and the solutions mixed, the amount of water in the mixed solutions being 122 lbs. Hexamethylenetetramine is formed in the solution by the addition of one quart of ammonia (26°Be) and one quart of 40% formaldehyde. The mixed solutions are stirred about an hour. Thin plies of wood or the like are coated with this solution and pressed at 300 to 400 lbs. per square inch at 120°C., when the formaldehyde will be set free, and combining with the gelatin and blood albumen will render the same hard and insoluble. Material thus bonded will stand boiling in water for several days without disintegrating.

Flooring tile. Geo. C. Hannam and Julius W. Schede, assignors to Rubberstone Corp., New York. U. S. P. 1,637,301 and 1,637,302, July 26, 1927.

The first patent covers a composition comprising 25 parts gilsonite pitch, 120 parts asbestos fiber and suitable amounts of coloring material. The second patent comprises a composition consisting of 13⅓ parts vegetable pitch, 33 2/3 parts cumarone resin (Cumar), 40 parts asbestos fiber and suitable amounts of coloring matter.

One-time Tooth Brush. Augustus R. Lee Read, Covington, Ky., U. S. P. 1,636,836, July 26, 1927.

A tooth brush that can be so cheaply constructed and made by machinery as to allow of its being sold by slot machines, comprises punching holes in the body portion of the brush, inserting loops of bristles through the said holes and cementing a back onto the body portion thus also serving to set the bristles. The brush is intended for but a single use. While cardboard, suitably impregnated is suggested by the inventor it would appear that this method of construction might with advantage be employed for other materials, such as pyroxylin, etc., especially for cheap brushes, etc.

Converting chloroform-soluble cellulose acetate into acetone-soluble cellulose acetate. Edward S. Farrow, Jr., assignor to Eastman Kodak Co., Rochester, N. Y., U. S. P. 1,634,986; July 5, 1927.

In the usual process of acetylizing cellulose the product obtained at first is only soluble in chloroform, but insoluble in acetone. In the past this was usually done by a process of hydration that was somewhat difficult to control, and which became the subject of a great number of patents. The present process is relatively simple and comprises treating the chloroform-soluble cellulose acetate with acetic acid and ordinary (ortho) phosphoric acid. A particular feature of the invention is the spray-drying of the mixture of solvent, acetic acid, and the phosphoric acid in accordance with a patent of Webb, U. S. P. 1,516,-225, Nov. 18, 1924. The dried material, which is in very finely divided condition, is washed with water to remove the phosphoric acid from the same.

Phonograph Record comprising cellulose esters. Robert Quait, Jr., New York. U. S. P. 1,635,862; July 12, 1927.

The record has a flexible core, waterproofed, and is flexible after molding. 35 claims cover the process and product, which is considered to be quite novel. For example, claim 33 reads: "A thin flexible record-disc consisting of a core having a coating of practically pure and gum-free cellulose ester and another coating of cellulose ester containing gum and abrasive, the last-named coating being suitable to receive and retain record-grooves, and said disc being sufficiently pliable and resilient to be rolled up and to retain its shape when unrolled." The abrasive referred to comprises rotten stone, pumice and the like; in other words, refers to what is ordinarily termed fillers.

Anti-static photographic film. Jacques Marette, Vincennes, France; assignor to Pathe Cinema, Paris, France. U. S. P. 1,635,681; July 12, 1927.

The production of "lightning" marks on film, which are caused by the static developed by friction when the film is passed through a motion picture camera, is prevented by coating the reverse side of the film with a composition comprising a mixed cellulose ester such as **plastic cellulose nitro-acetate.**

Elastic Floor Composition. Frederick E. Boelkow and Friederich W. O. Listing, assignors to Durable Floor Corp., Milwaukee, Wis. U. S. P. 1,635,982; July 19, 1927.

An elastic floor composition comprising a homogeneous plastic layer pressed into place and formed of wood flour, magnesite, white silica, flake asbestos and coloring matter saturated with magnesium chloride, and presenting a variegated colored surface.

Cellulose Acetate Composition containing tribromophenol. Stewart J. Carroll, assignor to Eastman Kodak Co., Rochester, N. Y., U. S. P. 1,631,468; June 7, 1927.

The already low inflammability or combustibility of films or other articles made of cellulose acetate can be still further lowered by incorporation of tribromophenol. Example: 100 parts acetone-soluble cellulose acetate, 5 to 75 parts of tribromophenol. The latter substance must be substantially free from uncombined bromine and hydrobromic acid.

Electrical Insulation Board. Daniel M. Sutherland, Jr., Trenton, N. J. U. S. P. 1,636,491, July 19, 1927.

A material for electrical insulation, which may be in the form of a panel or board, comprising 40% cellulose, 15% oil soap, 2% acaroid resin and 43% of gilsonite. The gilsonite is ground in water to at least 100 mesh. The oil soap is precipitated onto the cellulose fibers used by an aluminum salt. The finished panels are preferably given a finishing coat of cellulose acetate or nitrate lacquer.

(*Abstracts continued on page 542*)

Obtaining a Plastic Material from Sea-weeds. George F. Meehan and Arthur L. Kennedy, assignors to Kel-Plastic Corp., New York, N. Y., U. S. P. 1,633,262; June 21, 1927.

The present process differs from those that are aimed at the production of what is commonly termed "alginic acid" or "Tang-acid" (Tanginic acid), in that the sea-weeds (which are not mentioned by any particular name) are treated with an acid only, such as sulfuric acid at a temperature of from 18 to 60°C, the strength of the acid varying from 1 to 4%. The plants are first preferably dried, or at least partially dried before treatment. The acid liquor obtained from the plants is removed from the insoluble plant debris by filtration and pressing. The solution is mixed with a metallic solution to form an insoluble metallic salt that precipitates out from the solution. This precipitate, which is flocculent in nature, is dried at 70° C. When iron is used, the precipitate is brown, the copper compound being green. These compounds are **Plasticized by amino derivatives of the pyridine group,** possess very marked adherent properties and are well adapted to the manufacture of articiles by using these materials as a binder for fillers and molding the mixture.

"Fireproofed" product containing cellulose ethers or esters, as cellulose nitrate, acetate or an ethyl cellulose. Charles E. Burke, assignor to Du Pont Viscoloid Co., Wilmington, Del. U. S. P. 1,633,067; June 21, 1927.

Magnesium carbonate tri-hydrate is used in conjunction with either a rubber cement or a solution of a cellulose ether (ethyl cellulose), or even with pyroxylin. The inflammability is stated to be very markedly reduced by the magnesium carbonate trihydrate, which has the formula of $MgCO_3.3H_2O$. Tricresyl phosphate is also used in the preferred composition.

Insulating Material Made from Old Newspapers. Haughton Brown, Minneapolis, Minn., U. S. P. 1,637,547; Aug. 2, 1927.

Old newspapers are superimposed, preferably with a bulge toward the center, and are covered with a waterproofed sheet, like tar paper, etc.

Shoe stiffener, comprising use of pyroxylin and sugar. U. S. P. 1,637,709; August 2, 1927. George L. Preble, assignor to Preble Box Toe Co., Lynn, Mass.

A fabric, such as burlap or sheeting, preferably with some loose fibers within it, is impregnated with a solution of pyroxylin to which has been added a carbohydrate material such as dextrine, sugar, etc. Two preferred formulas are given: (1), 16 volumes celluloid solution of 20/Be, 4 volumes comminuted asbestos, 1 vol. dry dextrin and 12 vols. alcohol. (2), 20 vols. liquid celluloid (20° Be.), 4 volumes comminuted asbestos, 4 vols. comminuted Plaster of Paris, 1 vol. dextrin and 16 vols. alcohol. The dextrin is stated to increase the adhesive properties of the material. Hardening takes place by drying.

Casein Solids

(*Continued from page 539*)

among the various plants. While some manufacturers have evidently devoted much thought to this matter, some plants make use of racks and holders that are so improperly constructed that the formaldehyde solution can not get proper access to the casein solids, with the result that the goods produced are woefully lacking in uniformity.

Plates should either be hung or rigidly supported, while nevertheless all portions should be in contact with the solution. Every plant must be its own guide in this regard. To prevent adhesion of the plates where they make contact with each other, some operators sprinkle them with talcum powder. While this does the work, it nevertheless contaminates the hardening bath. On removal and drying the plates, however, the talcum increases the surface area and hastens the drying.

Speeding Up The Work

Up to quite recently, all attempts to shorten the hardening process aimed at definite concentrations of the bath, increase in temperature; additions to the bath of various chemical reagents; addition of formaldhyde to the casein prior to the hardening operation; addition of material giving off formaldehyde, etc.; but the results obtained were by no means satisfactory. The molding of casein powders, however, has recently been accomplished successfully. For the very best casein solids, regular bath induration is the only really sure way. The use of formaldehyde vapors instead of solutions has been described and attempted, but as far as I know, has not led to any practical results.

After the hardening of the material has progressed to the required degree, the racks holding the same are taken from the bath and placed or suspended above it, so that the adhering solution may drip back into the tanks. This is to limit the

losses of formaldhyde as far as possible. The articles are then carefully rinsed with clear water and dried. Sometimes the drying is done in sawdust.

As the correct drying of casein solids is an essential feature in the manufacture of these materials, it will form the subject of a special article, which will appear in our next issue.

Tooth Brushes

(*Continued from page 528*)

the operators is necessary to get a high polish and uniform results. One point upon which particular emphasis is to be paid, is the prevention of an undue rise in temperature when polishing the brushes, as this prevents the attainment of a really first-class high gloss.

The machines illustrated in the above article are of the manufacture of the firm of Eduard Meeh, in Pforzheim, Germany.

Hydraulic Press

(*Continued from page 526*)

cal advantages of this press include: hydraulically actuated ejectors both at top and bottom. These ejectors are operated independently of the main ram and allow the operator to eject molded pieces at any position of the main ram stroke with a resultant saving in time. The hydraulic reseating of ejector pins is positive and more dependable than spring-weighted ejectors. The ejection stroke available for top dies is from 0 to 3 inches on the smaller sizes, and 0 to 4 inches on the larger sizes of these presses, and this may be increased if desired.

The ejection stroke of the bottom dies is equal to the stroke of the main ram. This long stroke makes it possible to mold deep pieces and yet eject them without sacrificing any of the press opening space. The elimination of top ejector tension rods passing through the top head and bottom platen in-

creases the space available for dies.

The bolsters, top head, moving platen and holding down gibs are slotted to allow for varying widths of molds. The press is built in various sizes from 58 to 264 ton capacities, with platen sizes 23¼″ by 16½″ to 40″ by 27″ and openings between platens of 25 to 34 inches.

Condensation Products

(*Continued from page 524*)

Our German contemporaries are also busy in the synthetic resin field, the development being now in the hands of the German Dye Trust, otherwise known as the Interessen Gemeinschaft Farbenindustrie Aktiengesellschaft of Frankfurt-am-Main, Germany (the all-embracing I. G.). This organization is composed of the various German dye works such as the Farbenfabriken vorms. F. Bayer & Co., the Badische Co., Farbwerke-Hoechst vormals Meister-Lucius & Brüning, the Berlin Aniline Works, and other concerns, the combine effected since the war to meet world competition.

Crotonaldehyde

U. S. P. 1,640,899, Aug. 30, 1927, on an application of Walter Kropp, of Elberfeld, March 6, 1926, assigned to the I. G., covers the manufacture of condensation products of crotonaldehyde. A patent was also applied for in Germany on May 14, 1925.

The inventor refers to a German patent 372855, describing a process of making a synthetic resin of condensing aromatic bases, as for example aniline, toluidine, xylidine, alphanaphthylamine, etc., with various aldehydes.

The present invention covers the production of technically valuable products, produced by condensing crotonaldehyde with aromatic amines, the following being a typical example. To 56

parts by weight of crotonaldehyde 60 parts by weight of aniline are gradually added with brisk stirring. The temperature during this process should not be allowed to rise above 50°C. When all the aniline has been added, the reaction mass is further stirred for 3 hours at the same temperature, then allowed to set over night, and finally heated in vacuum to 125°C. until all volatile ingredients have been removed. The residue is a brittle resin.

No details of its possible uses, or methods for hardening it are disclosed, but it is quite obvious that the resin should have properties analogous to the other known phenol condensation products.

Flexible Phenol-Resin Articles

THE combination of phenol resins with certain forms of drying oils so as to obtain a more or less flexible condensation product has recently been solved. China wood oil, sometimes known as tung oil, or a compound derived from this oil, and termed "tox-tungate solid" is employed, together with cresol and formaldehyde. The main object is to obtain a phenol resin that is sufficiently flexible and yielding so that when an article impregnated with the same, as for example a radio panel, may be die-punched, drilled, etc. without any cracking or chipping.

The process, which is covered by U. S. P. 1,633,976; June 28, 1927, (applied for in 1920), is the invention of Arthur L. Brown, and is controlled by the Westinghouse Electric & Mfg. Co. who are assignees.

Broadly speaking, the inventive idea lies in the addition of an oil capable of polymerization to a phenol and an aldehyde, followed by the condensation reaction. A specific illustration, taken from the patent, reads:

Forty parts by weight of cresol and one part by weight of "tox-tungate solid", (a commercial lead-manganese resinate tungate, solid drier) are heated

together to about 115° C. until the drier is in solution. Ten parts by weight of China wood oil are then added, stirred thoroughly, then thirty parts by weight of a 40% formaldehyde solution are added, and these materials are then raised to 100—110° C. in a suitably covered kettle, provided with some form of condenser to prevent loss of formaldehyde during the heating process.

Condensing

The temperature is maintained at 100—110° C. until the wood oil has combined with the phenolic condensation product being formed, which time is determined by the fact that when the reaction is complete, none of the wood oil will be seen floating on the surface of the mixture. The compound then consists of two layers, the thick, viscous condensation product on the bottom of the kettle and the weakened formaldehyde solution on top. This reaction ordinarily takes place in about one hour to one hour and a half, dependent on the amount of the ingredients used.

Hot water is then added to the formaldehyde layer, the compound stirred thoroughly, allowed to settle, and the weakened formaldehyde is siphoned off or decanted. The small amount of formaldehyde solution remaining is then boiled out, care being taken not to raise the temperature above 130° C. The solution has been boiled enough when, upon cooling, a very viscous, clear mass is obtained. The material is then thinned with either benzol or a mixture of benzol and denatured alcohol, to the proper consistency for application to paper or other fibrous material.

Impregnating Paper

A sheet of paper is impregnated with the solution of condensation product, the paper then being dried by passing through a heated chamber or through heated rolls. A number of layers of paper are superposed and placed in a mold under a pressure of about 1000 lbs. per sq. in. and heated for several

hours at a moderately high temperature, about 120 to 140° C. The finished material may then be cut or punched while cold to any shape desired without any tendency to crack, splinter, tear, or shrink.

It was found, that if the process was carried out in an iron vessel, the finished article could not be punched while cold without some tearing, although it could be handled perfectly at about 60° C. If a glass or enameled vessel is used, this difficulty is not encountered. Apparently, the metal of the vessel has an effect on the product which, at the present, is considered undesirable and therefore a vessel of non-ferrous material, generally of glass or its equivalent, enamel-lined, is used.

The drier is an important ingredient in the new product since it exerts a catalytic action on the China wood oil, hastening its polymerization.

Cellulose Acetate Paper

(*Continued from page 529*)

freed from the membrane by leaching in a succession of water baths, called puring baths. The parchment membrane containing the cellulose acetate is dried then subjected to the heat and pressure treatment, hereinbefore described, whereupon the cellulose acetate will fuse throughout the product and render it more water-resistent and more durable.

Using Solvents

Instead of treating the parchment membrane after puring by heat and pressure, I have found that satisfactory results are obtained if the membrane taken from the puring bath is immersed in a solvent for the cellulose acetate, such as acetone, the solvent will enter the pores displacing the water and causing a film of the acetate to form throughout the product. Upon evaporation of the solvent, a water-resistant fibrous sheet homogeneously impreg-

Accessories
For Toilet Articles

WANTS

WANTED—Industrial Chemist and assistant to superintendent, one who has had thorough experience in production and manufacturing moulded materials. Wonderful opportunity for young man desiring a future; must live out of town; state all details in confidence in first letter for interview. Address Box 31, PLASTICS, 471 Fourth Ave., New York City.

For Sale

Mystic press in new condition. Very reasonable. Calendonia 0494, or Box 26, PLASTICS, 471 Fourth Ave., New York City.

Position Wanted

24 years experience mechanical drafting, 4 years experience designing bakelite and shellac dies. Now foreman at tool room. Experienced estimator. Box 27, PLASTICS, 471 Fourth Ave., New York City.

For Rent

Sprinklered loft 30'x60' in brand new building. Heat furnished. Box E 287 PLASTICS, 471 Fourth Ave., New York City.

nated with cellulose acetate will result.

The above described materials are available for a wide variety of uses, such as a raw material from which machine elements such as gears, pulleys, or the like may be formed or machined, and also as an electrical insulator, especially in the construction of switchboards for radio apparatus, a material for making containers, or other structures which it is desirable shall be unaffected by moisture, oil or other liquids. It is also applicable for the surface veneering of wood or cardboard.

Considerable modification is posible in the processing of the paper and in the percentages of cellulose acetate used with no departure from the essential features of the invention."

Laminated Casein Sheets

Sharply Defined Strata Now Possible

THE modern patents on the casein solids are not very numerous, and most of the producers of these materials have preferred to work either in secret, or to employ the time-honored methods; brought, it is true to greater perfection and adapted to mass production.

Laminated casein solids are however comparatively recent, and have been featured by at least one of the American producers of casein solids. For this reason, U. S. P. 1,604,805; Oct. 26, 1926, assigned by Edwin Potter Carpenter to the makers of *Inda* (American Machine and Foundry Co., Brooklyn, N. Y.) is of interest.

This invention relates to a process of making a laminated composition having a curd or casein, base, for manufacture into articles of commerce in many arts; and it has for its main object the production of a composition of this nature in which the laminations are so firmly consolidated that they cannot be separated.

In carrying the invention into effect, units of plastic composition, such as *Inda* or other material having a curd base, in sheets or in other forms, are

semi-consolidated under moderate pressure and heat, as in a hydraulic press having steam heated platens but not using its full power. When the units reach this stage, much of the moisture they originally contained has disappeared. But some remains in the interior of the composition, that adjacent its surfaces being dissipated by the direct action of the heated platens with which the surfaces contact.

Removal of Albumen Is Essential

Inda consists of casein curd which is devoid of fat and consolidated while in its natural wet state. Coloring matter is added to the wet curd when a colored product is desired, and albumen and natural salts are removed when a transparent product is desired.

In laminating the composition, it is desirable that a sharp line of demarcation between the laminations be preserved so that the union will not appear ragged. When two or more units are to be united to form a laminated structure the surfaces which are to be brought into contact are moistened with water in order to bring the moisture content of the material adjacent the surfaces up to that of its interior, and to prevent irregular or ragged flow of the material from one unit to another during the succeeding operation.

When two or more units have been thus prepared and assembled one upon another, the assemblage is subjected to greater pressure and heat, to fully consolidate the material throughout.

The pressure and heat used in the initial operation may vary considerably, but approximately 800 lbs. per square inch, with a heat of approximately 140°F. gives satisfactory results, for semi-consolidation. For fully consolidating the assembled units, however, a pressure of approximately 1500 lbs. per square inch, and a heat of approximately 178°F., appear to be best.

Final Curing

Upon full consolidation of the laminated composition, the moisture disappears, but the sharp line of demarcation between the laminations remains.

The units may be of any color desired, for the presence of proper coloring matter has no effect upon the consolidation of the composition.

After the laminated composition has been thus produced, it is cured in formaldehyde under pressure.

Transparent Sheets

Some time ago *Inda* was offered in the form of perfectly transparent sheets, but no information could be obtained as to the probable method of manufacture. In this patent however the inventor mentions the removal of albumen and natural salts as the basis of at least part of the method, saying that this process is covered by a patent application of July 3, 1925, Serial 41437. When this patent issues, we shall reproduce its text in full.

Safe Shipping of Pyroxylin

According to a British patent granted to the German Dye Trust (I. G. Farbenindustrie A. G.) (252,382, May 20, 1925,) pyroxylin that is to be employed for industrial purposes, such as the manufacture of plastics, lacquers, etc., is rendered non-explosive and safe for shipping by being kept wet with alcohols having a higher boiling point than the ordinary alcohol hitherto employed for this purpose.

Propyl alcohol, butyl alcohol, amyl alcohol, or glycerol may be used, as these substances may be left with the pyroxylin and perform useful functions in the final products made from the pyroxylin. The advantages lie mainly in the fact that the substances described do not dry out as readily as ethyl alcohol.

MOLDED PRODUCTS

Devoted to the purchase, further use and merchandising of all manner of molded parts

Vol. 1 OCTOBER, 1927 No. 6

Dentistry Advanced by Plastics

Dentures and dental appliances afford a growing field for the application of plastic materials and particularly the phenol resinoids.—They are durable, sanitary and generally resistant to any chemical actions encountered in use

By A. Moses

VULCANITE, a hard rubber product, has been widely used for artificial dentures, and for this reason—it can be molded (vulcanized) under heat and pressure conditions which do not disintegrate the dental cast made of plaster of Paris or similar material.

The phenol resins may be considered substitutes for hard rubber, but the rather drastic heat and pressure necessary in molding the usual forms of these products, militated against their use.

A Forward Step

However, impelled by the benefits expected from phenol resin dental plates, the last year or so has seen the development of such dentures. Indeed, this development has been heralded as "the greatest step forward in denture construction since the advent of the vulcanization of rubber."

After numerous experiments a blend of one of the best known phenol resins was developed which could be molded without the application of the usual intense pressure. Concurrently, an entirely new plaster investment was evolved, together with a special thermostatically controlled electrically heated press.

CELLULOID, very early in its career, was applied to the construction of dental plates. Indeed, the pioneer experiments of John W. Hyatt, the inventor of Celluloid, demonstrated its fitness for this purpose. (See PLASTICS 1926, 131) The gum resin shellac has also been utilized in this connection. In fact, on account of their plasticity under heat and pressure, followed by rigidity on cooling, many composition materials should be adaptable.

These dental plates with their natural uniform pink color are both pleasing and lifelike in appearance. The surface being highly polished, it is difficult for bacteria to get a lodgement there.

The resistance of these dentures to the prolonged action of boiling water and to such antiseptics as mercuric chloride, hydrogen peroxide and formaldehyde, makes it safe to clean and effectively sterilize them. Mouth secretions also do not affect them.

Advantages Over Rubber

It is claimed that owing to the absence of sulfur or mercury, there is no possibility of mercury contamination nor of hydrogen sulfide generation. Further, cases of "rubber" mouth soreness are conspicuous by their absence. For the same strength, a phenol resin denture is about one-third lighter than one of hard rubber, and what is more, it is claimed that the former product will become stronger with age.

As with the ordinary phenol resin molding compounds, metal inserts can be embedded with great facility. Here of course teeth, lingual bars, clasps and the like are the inserts and the resinoid adheres firmly to them. These dentures can be repaired without difficulty.

A partial lower phenol resinoid denture (Lennite) with metal teeth attached. (*Courtesy Ohio Chemical & Mfg. Co., Cleveland, Ohio.*)

In work such as this, accuracy in model detail is a consideration of first importance, a requirement well cared for by the precision with which the resinoid can be molded.

Strangely enough, the peculiar claim is made that these dental plates have high thermal conductivity, a property not only conducive to greater comfort but also to better gastronomic functioning.

While this material (known as "Lennite") was under development in this country, where the practice of prosthetic dentistry has reached its highest point, a very similar application was patented in Great Britain. According to this, a model of the gum is first made in wax on the denture. Then the whole is "invested" in a porous molding mass able to resist hot water and dry heat. Next, the wax is melted out and the hollow filled in with a pasty mass of phenol resin. Fusing and hardening of the latter then follow.

The porous "investment" may consist of equal parts of gypsum and pumice or quartz powder. The patent referred to is that issued to L. Oberläender and is British Patent 238,446 of Dec. 24, 1924.

A British Development

The phenol resinoid Bakelite is now being used to face rubber and metal dentures. It provides a coating at once translucent and natural. For it, claims are made similar to those put forward for the phenol resinoid denture itself. The material comes in strips and is applied by means of alcohol working at a slightly elevated temperature. Dr. G. M. Hick developed the material, (Ixolain) in England.

Besides forming the handle of the indispensable tooth brush, quite a variety of functions in many dental departments falls to the lot of the pyroxylin plastic products. They provide dental plates and jaws for purposes of instruction and display. Molds for casting artificial teeth can be made from them, while for filing in between teeth, Celluloid strips, surfaced like sand paper, are available.

Pyroxylin X-ray Screen

Besides forming the base for X-ray negatives, these materials may perform a very great safety service in radiology. As already described (PLASTICS 1927, 56), according to a patented process assigned to the Celluloid Corporation, by incorporating suitable protective fillers, pyroxylin plastic sheets can replace lead plates with advantage.

In their Electro-Diagnostoset, a portable collection of instruments and orificial lights, Cameron's Surgical Specialty Company uses Bakelite insulation exclusively. Not only can such parts be sterilized with safety but with all metal connections molded in place, all danger of flickering at moments of crisis is eliminated.

In Mechanical Dentistry

At the recent Chemical Industries Exposition held in New York City, two other applications of phenol resinoid in dental practice came to light. While only small in size, they nevertheless exemplify two very important characteristics of these materials — chemical inertness and heat resistance. One, a small mixing barrel executed in transparent Bakelite, represents a case where chemical inertness is essential, while a minute molded ladle is a good example of the utilization of the same product's properties of non-conductivity and resistance under heat.

The variety of Bakelite applications in the dental field is well shown in this illustration. The time switch used in making X-ray photographs has a molded body. To the right, dental chair arms will be readily recognized. The dental plate (lower left) is molded from a special type of Bakelite material, while on the mouth lamp (center), another adjunct in dental X-ray work, phenolic resinoid is represented by the lamp socket and connection plug.

On the operative side of dentistry, the phenol resinoids have a growing number of applications to their credit. Two of these have already been discussed in these columns, the dental chair arm molded of Bakelite and the dental spotlight with a number of components made of the same material. (1927, pp. 291 and 370).

For such an appliance, metals would be at a distinct disadvantage, not only on the score of high thermal conductivity, but also because of their tendency to combine with and so contaminate the low melting-point alloys and amalgams comprising the working materials of the dentist.

Bakelite Corporation's representative display of molded and laminated products, emphasizing the contribution of these phenol resinoid materials to radio's phenomenal progress.

At the Radio World's Fair

EVER since electrical science gave humanity the priceless gift of wireless reception, the radio industry and that of the plastic materials have been closely connected. In fact, no small share in radio's early progress can rightly be claimed by the synthetic resins, materials ready to hand with all the properties requisite for the dial-and-knob-studded panels of those early days.

As simplification set in to beautify and remove the technical aspect of the receiver, the number of resinoid radio parts began to decrease. Yet today, it is safe to say that no radio is without some molded part in its makeup. It is no matter for surprise then, to find among the exhibitors at Madison Square Garden several organizations interested in molded and laminated products.

Bakelite's Dignified Display

In a setting at once dignified and distinctive, the Bakelite Corporation made use of a side booth in the main arena to display a comprehensive collection of molded parts. Their booth comprised six wall panels of radio parts and two side tables of miscellanous products, the former tastefully lighted and framed in a style reminiscent of the Gothic.

One panel was devoted largely to dials, another to laminated panels and sub-panels, while a third displayed condensers and coil housings for tuning circuits. Worthy of note were certain art dials sold by the Pilot Electric Co., capacity strips molded by Kurz-Kasch, and a series of coil frames put out by Aero Products Co.

Versatility Exemplified

Another panel featured molded sockets and rheostats. Prominent here was the Benjamin socket provided with spring supported contacts. Radio tubes and their bases comprised panel five while miscellaneous radio parts filled the last of the series.

On the side tables was displayed a collection of parts to demonstrate the versatility of the resinoid. Several have already been described in these columns; as for instance, the Resonata loud speaker, and various parts for soda fountains. Among newer applications, mention may be made of the Tyrman drum dial and certain loud speaker coil spools. The latter should be interesting exhibits from the point of view of the molder's art.

An interesting electrical accessory was the rug plug and floor lamp connector, molded by the Belden Co. It consists of a molded outlet connected by means of a flexible insulated strip to a connecting block. The latter is hooked up in the usual way to a wall plug. Desk phones and various types of dial holders for them were prominent.

Several examples of thin shell molding were on view. Outstanding were a handsome collar box and a Bulle electric clock case. The former was designed as a candy container in the first instance and both were molded by Kurz-Kasch.

Worthy of mention were a number of dashpots made of graphite and Bakelite, similar to that already pictured (June, page 291) and designed for use in the penthouses of elevators and on weighing machines. The precision with which the plunger and housing fitted together was truly remarkable.

Remarkable Molding

In the automobile field, a combined throttle control and spark advance unit, molded for Pierce-Arrow attracted attention. As a molding job it

(*Continued on page 555*)

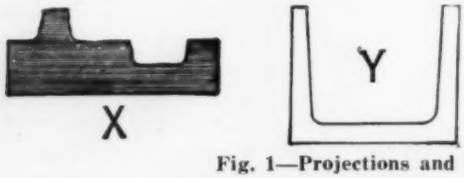
Primary Factors in Design*

A pertinent discussion of certain basic considerations in the correct design of molded parts which should do much to facilitate production and secure products of optimum quality

By Lawrence E. Barringer

Engineer of Insulations, General Electric Company

SINCE it is impossible to obtain all desirable characteristics to the fullest extent in any one molded material, the designer should carefully list his requirements in the order of their importance and then select the material which is superior in the most important respects.



Illustrates the necessity for draft or taper and rounded corners to facilitate removal from the mold.

Fig. 1—Projections and Depressions

It is in the actual design of molded pieces, however, that the designing engineer, producer, and user must co-operate to the fullest possible extent to secure the best results.

First of all, the engineer should calculate as closely as possible the service requirements as to mechanical strength, temperature conditions, degree of insulation, etc., and proportion the molding to meet the requirements with due consideration to the quantitative values or constants for the material selected. These figures should be furnished by the manufacturer and should be the result of generally accepted standard tests.

This is only the beginning, however, for often a carefully calculated design may be one difficult and expensive to produce, and subject to greater variation in values than should be the case.

If designer and producer consider the design details thoroughly, it will often be found possible to change certain of these details in such a way as to simplify or strengthen the design very greatly, with consequent saving both in the mold or tool expense and in the cost of production.

The ideal form of a molded piece is the cylinder as this requires only turned work in making the mold and the fewest number of mold parts, and results in ease in molding, uniform wear on the mold, and a minimum in corners and edges to clean in making or to increase the chances of breaking in the finished pieces. Of course any great proportion of parts cannot be made cylindrical but this fundamentally desirable shape is not used as often as is possible.

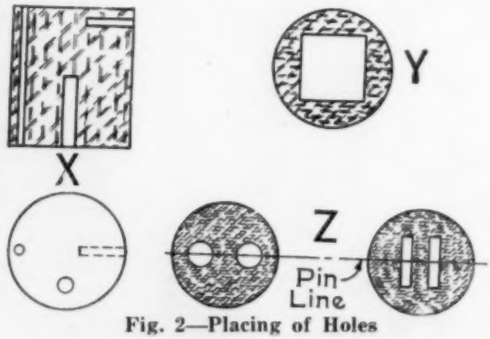
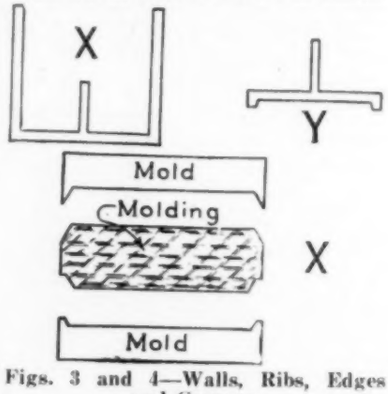


Fig. 2—Placing of Holes

Part X illustrates undesirable positioning. The square hole, as in Y, is also not good practice. Z indicates correct placing of holes at the "pin line."

Important considerations in designing are given in some manufacturers' catalogues and in a few technical publications, but for unusual or intricate designs it is best to consult with the producer before the details are finally fixed.**

Much might be said in connection with design details, but only a few characteristic examples will be considered here, all with reference to the sketches.



Figs. 3 and 4—Walls, Ribs, Edges and Corners

This walls and ribs or sharp inside corners (X and Y upper Fig.) are best avoided. To lengthen the life of the mold, it is better to use the configuration in the lowest figure rather than the mold-form in the upper drawing.

Ample draft or taper should be provided for both projections and depressions, as illustrated in Parts X and Y of Fig. 1. Corners should also be rounded as shown. These features permit the freshly pressed

*From "Molded Insulation" by Mr. Barringer in General Electric Review, August 1927.

**See MOLDED PRODUCTS, May and July, 1927.

pieces to be readily removed from the molds, but it is obvious that a greater degree of taper should be provided for cold-molded insulation than for hot-molded since with cold-molded material the parts are removed from the mold before hardening and are much more fragile. As a rule 1-64 in. to the inch should be provided for most cold-molded material. The exact amount of taper, however, depends upon the size and shape of the pieces.

Placing of Holes

Parts should not be designed with holes near the edge or face of the moldings, particularly with cold-molded insulation. There should preferably be 1/8 inch of material between the wall of the piece and the hole. Very small holes requiring thin delicate pins should not be demanded nor a horizontal hole requiring an unsupported pin in a horizontal position in the mold, since long thin pins or horizontal pins bend or break readily and hamper production. Part X in Fig. 2 illustrates these undesirable features of design. A square hole in a round piece with the corners close to the edge is also undesirable as shown in Part Y of the same diagram.

Often a number of holes in a row are required and these frequently so reduce the material in the central cross-section that there is great weakness at this point or what may be termed the "pin line." In such cases a study should be made of the design with a view of strengthening the material at the pin line, possibly by providing rectangular holes instead of round holes, as shown in Part Z of Fig. 2.

Thin walls, or ribs, or sharp inside corners such as in Parts X and Y of Fig. 3 are very difficult to produce successfully.

Very often bevelled and rounded edges are called for in molded insulation parts. While pieces can be produced with such edges, suitable molds require a sharp edge at that part which forms the bevel or radius as shown in the upper portion of Part X in Fig. 4. This sharp edge of the mold wears rapidly and must be replaced frequently if the bevel or radius is to be maintained; but it is suggested that where other than a square edge is required, the bevel or radius be offset as shown in the lower portion of Part X in Fig. 4.

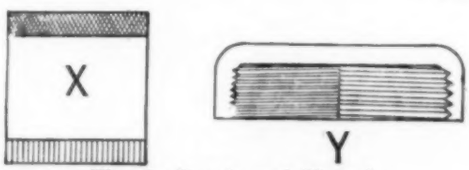


Fig. 5—Knurls and Threads

Straight is preferred to diamond knurling. Screw threads should be as bold as possible.

Where knurling, threading, or grooving is needed, care should be taken to provide surfaces which can be molded readily in simple molds. For instance, horizontal rather than diamond knurling, should be employed, as in the lower portion of Part X in Fig. 5 rather than as in the upper portion of the same illustration, since such design can more readily be made in a small mold, whereas the diamond knurling requires two or three extra parts so that the mold can be taken apart without marring the knurling. Threads and grooves should be made bold, as in the right-hand half of Part Y in Fig. 5, rather than small or fine.

The proper designing of inserts is of great importance and

(*Continued on page 567*)

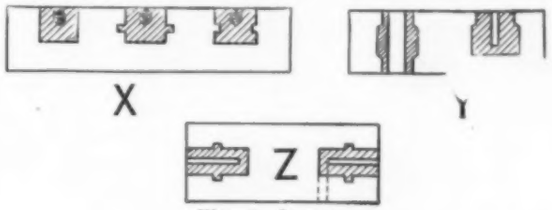


Fig. 6—Inserts

For secure anchorage, inserts should be indented as at X. They should be so placed that support in the mold is possible.

At the Radio Show

(*Continued from page 553*)

presented an interesting study in what were ostensibly undercut recesses. The booth was in charge of Mr. Preston Scott.

Celoron's Exhibit

The Celoron Company occupied a large central booth in what was termed the Exhibitors' Hall. As was expected, laminated materials and their products loomed very largely here. Instructive features were specimens of laminated stock, showing, in part, the resin-treated layers before being subjected to pressure. Some idea of the resistance to tearing offered by these products could thus be gained, particularly when it is remembered how much of a feat it is to tear a pack of cards across.

Here was also a comprehensive display of punched Celoron parts and various gears for tuning-control, automobile timing and mechanical purposes. Although only small in size, there was one item which should find ready use in those tonsorial mysteries surrounding the hair-waving process—the scalp-protector. This consists of a pair of double-lobed laminated pieces, rotatable about a connecting eyelet. It can be clasped round the lock being treated at the scalp and serves to protect the latter.

Of some interest was an exhibit of laminated stock of high dielectric and tensile strength, capable of being cold-punched without fracture. By its use the preheating process can be eliminated, a circumstance conductive to that rapidity in working so essential for

(*Continued on page 570*)

Up-to-date Ideas in Lighters

Whether as a pocket lighter or for use on desk or automobile, makers of these popular accessories are finding that the use of molded components offers many advantages

UNTIL comparatively recently, the pocket lighter was regarded more as a novelty than as an effective adjunct for the smoker. There seemed to be a certain lack of positiveness about its action with the result that these wayward instruments fell from popular favor. Lately, however, more expensive and substantial articles, some backed by names to conjure with in the realms of My Lady Nicotine, have made their appearance and seem slated for more enduring popularity.

More Metal Replacement

There is a marked tendency to replace the metal part by the molded component wherever the latter can improve the complete article. It was not very surprising, then, to find that molded phenol resinoid is being utilized to render permanent this recrudescense of the pocket lighter. With a pocket instrument, lightness is a *sinquanon*, a consideration well cared for by the low density of resinoid as compared with metal. Those other desirable properties of metal—enduring wear and non-inflammability—are also shared by the resinoid to an extent sufficient for the purpose.

A desk cigar-lighter with molded body. (Illustration courtesy Bakelite Corporation).

A pocket lighter with a metal reservoir. Now the latter is molded complete with metal parts to fit airtight. (Courtesy Matchless Utilities, New York).

Vogue of Color

As all the metal parts are embedded during the molding process, there should be no tendency for them to work loose with a consequent loss in that airtightness so essential for the lighter's proper functioning. The vogue of color, so well marked a trend today, can also be catered to. Indeed, from the point of view of saleability and daintiness, the same arguments should apply as were used in connection with the molded compact of Terri, so recently described (September, page 484).

From the production point of view, the replacement of metal by resinoid should lead to many economies in manufacturing operations. The Rex. Manufacturing Co., Providence, R. I., are the makers of the lighter, known as Pyralite.

As a piece of modern office equipment, the desk electric cigar lighter has certain advantages to offer—the points of cleanliness, safety and convenience. In their construction, the use of phenol resinoid can serve to improve the product and simplify production. Consider the lighter made by the Connecticut Automatic Specialties Co., Bridgeport, Conn. Using a body molded of Bakelite cares for both electrical and thermal insulation, and so makes the lighter safe and comfortable to handle. Further, the use of certain pieces of insulation necessary with metal is thus obviated. Color can also be injected, in harmony with surrounding fittings. Similar considerations apply to the Matchless Lucifer lighter, which has a body part of Bakelite.

For The Automobile

The Rhamstine Wireless Lighter with its two components molded in Bakelite.

Turning to lighters for use on automobiles, a rather novel accessory has recently been announced. This is the Wireless Cigar Lighter, made by J. T. Rhamstine. It consists of two pieces, base and lighter, both molded of Bakelite. In the base are provided during the molding process, all recesses and

(*Continued on page 571*)

Reinforcing the Molded Insulator

By using a filler of bundles of hard twisted cord, analogous to those used in automobile tires, phenol resinoid insulator-studs can be molded superior in service to similar vulcanized fiber products

To assure great strength, it is customary to reinforce the binder in a molded part by methods analogous to those used with concrete structures and with automobile tires. For this purpose, textile fibers, canvas cloth and similar materials are used, wire or wire cloth being of course precluded if the insulating properties of the product are to be preserved. Noteworthy examples of this method of reinforcement, already described in these columns, are gears, fans and aircraft propellers.

* * *

IN certain classes of electrical apparatus, such as high tension transformers for example, it is necessary for electrical considerations, to fasten two or more parts together with screw-threaded studs made of insulating material having high tensile strength. For this purpose, they have usually been made of vulcanized fiber, but instances of failure are becoming more and more frequent as the studs are called upon to withstand great stresses. Due to the limits imposed by the size of the parts to be united, it is in most cases impractical to increase the diameter of the studs and so obtain increased strength.

On High-Tension Switches

For high tension switches for example, it is usual to connect certain of the operating parts with rods made of insulating material of which the requirements are that the material shall be strong for a given cross-section in the direction of its length, stiff against a bending stress, and of high insulating properties.

After much experimental work with various fibers and a binder, it was found that studs, rods or equivalent devices of great mechanical strength and high insulating properties can be made from spinnable textile fibers, such as cotton for example, where the fibers are arranged in the form of longitudinally-extending, hard twisted cord and a binder, such for example as a phenolic condensation product. Strong screw threads may be formed where necessary at the same time as the article is molded.

A molded insulator-stud reinforced by a bundle of cords held under compression as in an automobile tire.

The accompanying drawing is a view in elevation of a threaded stud. In it, 4 represents a stud composed of a large number of axially-extending, hard twisted, cotton cords, 5, held under compression by a binder of Bakelite or equivalent material.

Fiber Embrittling Prevented

In such cord, the fibers extend lengthwise and are also twisted, an arrangement giving great strength. By using hard twisted cord the fibers are under initial compression, a circumstance which prevents the binder from working into the heart of the fibers when treated and thus render them brittle. Furthermore, such a cord occupies the minimum space for the amount of material employed. Various binders may be used, a phenolic condensation product being one good example. The cords are first treated with the binder generally in liquid form and afterwards dried to facilitate handling.

The cord may be treated as such or may take the form of the material used in making automobile cord tires. As is well known, this consists of a number of cords arranged side by side with a relatively few weak cross threads serving as carriers only. Using this tire material somewhat simplifies the coating process, and in some cases simplifies the subsequent operations somewhat.

Method

After the cords are properly coated, they are placed side by side in a suitably constructed mold, and along its length, the mold closed and the cords subjected to heat and heavy pressure. The heat first causes the binder to soften, permitting the cords to adjust themselves one to the other so that the density of the final product is uniform throughout, and later to harden and hold the cords and, of course, their fibers in a compressed state upon the application of high pressure.

The mold is preferably closed at its ends to form the end surfaces of the article. If threads are needed, they are formed at the same time by having threads on the interior of the mold. The pressure on the cords will force a limited amount of fibers into the threads of the mold and the rest of the thread will be formed by the binder. The rods may be round, square, oval, etc., according to the shape of the mold. For screw-threaded studs, the nuts 12 are also made of insulating material. These may be molded of cotton fibers and a binder such as the phenol resinoid Bakelite.

(*Continued on page 571*)

Phenomenal Use of Resinoids

The rapid growth in the manifold applications of molded and laminated products accounts very largely for the remarkable rise of the synthetic resin industry

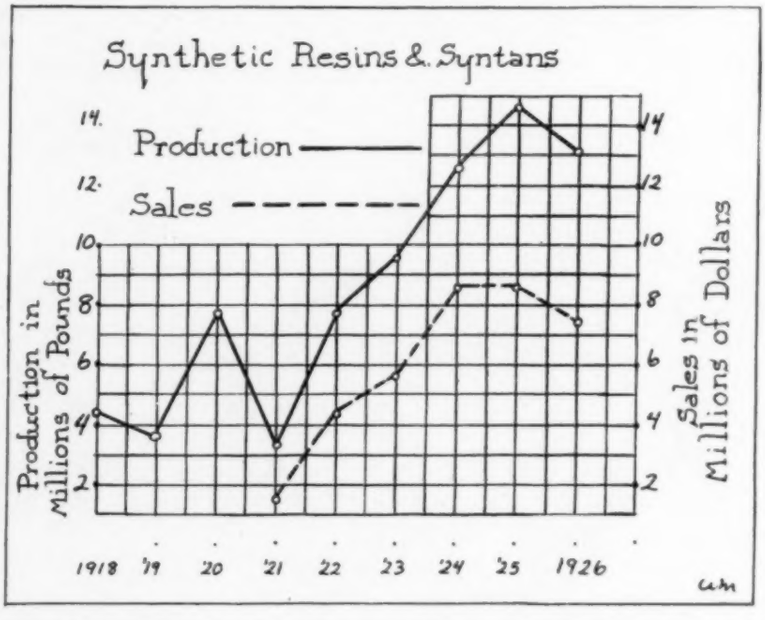
Industrial and Engineering Chemistry for August contains an article "Trade in Synthetic Resins and Their Raw Materials," by Otto Wilson. As the phenomenal rise of the phenol resinoid industry—in four years the output doubled—must be a subject of keen interest to our readers, the portion of the article covering the resins is here reproduced.

By far the largest share of these materials found their way into molded and laminated products—ample evidence of their rapidly growing use. There must still be numerous cases where the investigation of their possibilities would be well repaid.

* * *

IN studying the remarkable expansion in the use of synthetic resins, an expansion which has doubled their output in four years, we are impressed once more with the interdependence of modern industries. The radio, springing up overnight, found ready at hand these most useful of plastics and profited greatly by them, and they have played an appreciable part in the 100 per cent increase in automobile output since the war and in the steady growth of the electrical industry. Demands from these and a great variety of other industries have in turn raised the manufacture of resins to a position of commercial prominence from which they look forward to a far greater growth in the years ahead.

Because of the centralized manufacture of the resins in this country the Government for the most part has been unable to publish figures showing the annual production. Sales and production figures are available only for the years 1920, 1921, and 1922. Since 1922 they have been incorporated with the returns for synthetic tanning materials (Syntans). The total for these two classes of manufactures combined shows a rapid rise, registering a gain in the three years preceding 1926 of nearly 60 per cent. Most of this gain may be attributed to the resins.



A graphic representation of the phenomenal rise in the use of synthetic resins since 1918, based on statistics in Mr. Wilson's paper. Unfortunately figures for the synthetic tanning materials (sytans—phenol sulfonic acids condensed with formaldehyde) are also included, but the increase in the use of the latter since the war has not been very marked.

Preliminary Returns for 1926

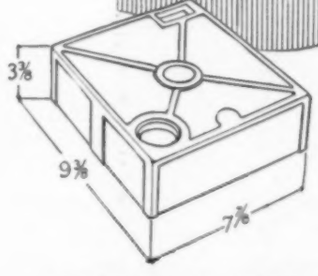
Recently announced preliminary returns for 1926 show a slight falling off in total production of these commodities as compared with the previous year, and a decrease in total value of sales but a gain in quantity of sales. But that, of course, does not necessarily imply a decrease in production.

The figures on which the chart is based, gathered and published by the United States Tariff Commission, show the output and sales of these resins and of synthetic tanning materials for the last nine years.

Of the various forms in which these resins are marketed, the molding powders and laminated blocks, tubes, etc., make up by far the larger part of the totals given in Tables I and II. No figures have been made available to the public which would indicate the proportions of the total represented by these classes or by the resins in the forms of var-

PLASTIC MOLDING

Bakelite Motion Picture Camera Box, moulded by Shaw



If YOUR JOB is one that requires expert craftsmanship, if your molded parts must be perfectly made and finished to the highest degree of accuracy, it will pay you to consult Shaw.

In other words, if your first consideration is to procure quality molding you need a quality molder.

Producers of the finest in moulded parts for thirty-five years.

SHAW INSULATOR CO.

IRVINGTON, NEW JERSEY

Established SHAW 1892

nishes, cements, or the hard transparent article, except that the one large manufacturing company gave as its total output of the last-named product in 1925 about 178,000 pounds, only a small fraction of the whole manufacture of resins.

Foreign Competition

Born in America, the synthetic resin industry was early established on both sides of the Atlantic. But its development here has been a response to domestic demands, and except in the importation of raw materials it has figured little in foreign trade. Synthetic resins are not listed separately among the country's exports, but sales to foreign countries are of no great consequence. The only recent year for which statistics of the trade were published was 1922 when 128,000 pounds valued at $13,000 were exported, nearly all to Canada. The principal channel through which they find their way abroad is in the form of the great variety of manufactures into which they enter, and these are not distinguished statistically from similar articles made from other materials.

I Production

	Manufacturers	Pounds
1918:		
Resins	5	4,233,400
Syntans	1	
1919:		
Resins	5	3,794,500
Syntans	1	
1920:		
Resins	4	3,142,900
Syntans	4	4,659,700
1921:		
Resins	3	1,643,800
Syntans	4	1,902,600
1922:		
Resins	5	5,944,100
Syntans	4	1,910,500
1923:		
Resins	2	9,763,700
Syntans	3	
1924:		
Resins	2	12,778,100
Syntans	3	
1925:		
Resins	2	14,687,100
Syntans	1	
1926:		
Resins	2	14,107,000b
Syntans	2	

In the import trade the resins of foreign manufacturers are effectually held back at the border by the high duties, particularly by the provision in the 1922

Tariff Act for American valuation as a basis for computing ad valorem duties. The present rate is 7 cents per pound and 45 per cent. Even at this rate there is a certain small trade.

Imports of Synthetic Resins*

Year	Pounds	Value
1919	1114	$ 2860
1920	2479	2681
1921	1420	2366
1922	2518	3498
1923	3183	10512
1924	8756	4183
1925	1537	889
1926	1649	1298

*Figures since 1922 are for "resin-like products" prepared from coal-tar derivatives.

II Sales

	Pounds	Value
1918	a	a
1919	a	a
1920	a	a
1921	a	a
1922	1,674,500	$1,352,200
	1,721,400	141,000
1923	6,415,900	4,315,200
	1,981,600	103,600
1924	10,068,400	5,816,600
	12,745,500	8,818,000
1925	13,896,600	8,698,800
1926	14,325,000b	7,647,000b

a Not stated
b Preliminary

The tariff, however, does not cover articles made from the hard, amber-like form of these resins, and in these lines competition from abroad has been keenly felt. After the war the manufacture of beads and smokers' articles, such as cigar and cigaret holders, from synthetic resin for awhile achieved encouraging results. But presently similar imported goods began to displace them, and salesmen for the American articles were met everywhere by the statement that the foreign goods could be had at far lower prices than they could quote. American manufacturers in these lines were practically driven from the market.

Say the Word — We'll Deliver

YOU have a job of complicated molding, perhaps with intricate inserts, that must be done in a hurry? Call us in. If it's physically impossible, we'll tell you so, but if we take the order, *we'll deliver.*

We'll deliver on schedule, right the first time, because we have to. To keep our production lines clear, every job *must* be out on time and up to specifications so there'll be no returns. Molds *must* be exact so that the finished piece will be exact and require no machining. Inserts *must* be precise so they'll fit. That's all our worry, not yours.

You place one order, we do four jobs. And we'll do them and deliver them as you want them.

Molded base for the Dulce-Tone radio-talking-machine-speaker, with six threaded brass inserts imbedded. Finished complete when taken from the mold.

High tension plug cast with a continuous thread, eliminating seam.

Molded connection plugs for electrical appliances are much stronger and retain their attractive polish.

Specifications Promptly

Send your blue-prints and specifications to us for a bid on your job, and you'll get that bid back in prompt order. From top to bottom, including our Estimating Department, we're geared up for fast delivery, and that means much in helping you quickly over the preliminary stages and even more, later, in assuring you delivery of finished product on time.

International Insulating service is almost as old as molding itself and that entire experience is at your disposal, at no obligation, to help you determine how molding can improve your product and cut its cost by eliminating many production steps which molding makes unnecessary.

PRECISION MOLDERS OF BAKELITE AND SHELLAC COMPOSITION

INTERNATIONAL INSULATING CORPORATION

Division of The General Industries Co.

ESTABLISHED 1875 ELYRIA, OHIO

On the ground of unfair competition a number of firms requested the President to bar these goods from entry into the United States, asserting that they were identical in composition with those made from materials and processes covered by United States patents, and in many cases were represented to be of a material covered by a United States trademark. On the recommendation of the U. S. Tariff Commission a temporary order was issued prohibiting the entry of these goods, and in May and June, 1926, extended hearings were held to determine whether this order should continue in force. In December an order was issued permitting the entry of these articles after December 6, the date when the first two synthetic resin patents, taken out seventeen years before, expired, but making an exception of multi-colored articles, on which further hearings were held early in 1927.

Tariff Decision

The final decision of the commission, dated May 25, 1927, upheld the claims of the complainants. It recommended that synthetic phenolic resins and articles made wholly or in part from them, as covered by two specified basic patents, should be excluded from entry into the United States, as well as articles made from any kind of synthetic phenolic resins unless they were marked so as to distinguish them clearly from articles made of such resins produced by the Bakelite Corporation. The decision was not unanimous, two of the five commissioners dissenting wholly or partly on the grounds that the patents concerned were in dispute and that the commission's right to assume their validity, under the circumstances, was doubtful.

Costs in Europe

As disclosed in the hearings, European costs of producing these goods are one-half to two-thirds lower than the American cost. The reasons for this large difference have not been officially ascertained, but very apparently they lie chiefly in lower

manufacturing costs, which make up the larger part of the total production cost. Processes in Europe involve greater use of hand labor than those in this country, and in the chief competing countries, including Czechoslovakia, Austria, and Germany, labor costs are much less than here.

Considerations in Design

(*Continued from page 555*)

should be carefully done. Of course all metal parts must be securely anchored whether by projections or indentations, as shown in Part X of Fig. 6. As in the case of pins for horizontal holes, inserts should not be placed horizontally without a support. For example, the left-hand insert in Part Z of Fig. 6 would be difficult to fix properly, whereas in the same piece the insert shown on the right could be located readily by means of a hole through the bottom of the piece and the insertion of a supporting pin at this point.

Inserts

In Part Y of Fig. 6 the left-hand insert may give more difficulty than at the right because a variation in the length of the metal piece would cause a similar variation in the height of the compound, i e., the mold could not be closed beyond the height of the insert, weak, spongy compound might thus result if over-sized inserts were unsuspectingly employed.

These are but a few of many illustrations that might be given of design details which would prove highly advantageous not only with respect to the ease of production but also to the degree of success with which the pieces meet assembly and service requirements.

"At The Chemical Industries' Exposition"
See November Issue

Windows on Possibilities for

IT is still a moot point whether the present plethora of flying exploits has more than an ephemeral significance for the progress of aviation. The fact remains, however, that commercial flying is in the ascendant. Indeed, it has been stated that airplane manufacturers now outnumber automobile makers.

A Difficult Problem

One of the problems confronting airplane designers is the provision of suitable windows and wind screens. Such glazing must be transparent, resistant to vibration, shock, and driving rain, and must not cloud over easily. It must have sufficient rigidity to withstand the air pressures developed during steep climbing and descent. Another very desirable property would be non-inflammability for safety.

"Safety" Glass Unsuitable

Apparently safety glass of the Triplex type—two sheets of glass with an intermediate film of cellulose acetate—is not practicable. One reason is the too great readiness with which the material clouds over. Another is the inability of this type of glass to be bent into curved surfaces.

Pyroxylin plastic sheeting meets most of these requirements, and is now extensively used. Cases in point are the "Spirit of St. Louis," made famous by Colonel Lindbergh, and Commander Richard E. Byrd's "America." Pyralin sheet 60/1000 inch thick was used for both side and overhead panels on the former plane. This material as well as "Amerith" is now being used for commercial planes, while many government craft are Pyralin-equipped.

European practice calls for the use of non-inflammable sheeting with cellulose acetate

Aircraft Offer Plastic Materials

base, and there should be room for developing the acetate products here. In this connection, it is noteworthy that one of the transparent forms of the casein solids is now being tried out by U. S. Navy aircraft authorities. Pollopas, a form of urea resin synthetic glass, should also be distinctly promising. It has already been tried for port-hole fitments on British war vessels, but its too ready solubility in water would first need be overcome.

Automobile Screens

A somewhat cognate application is the non-shatterable automobile wind screen. Some form of safety glass of the Triplex type is commonly employed. In case of an accident, where the occupant of the car may be thrown against the screen, pyroxylin plastic sheeting should offer many advantages. As a matter of fact, good results followed the use of thick Pyralin sheeting to form the window at the rear of the driver on many lines of Yellow Taxis.

Molded Products in China?

Civilization in China must indeed be progressing at a rapid rate if the object of a recent call may mean anything. It seems that the possibilities of molded products in China are being looked into by an American resident in that troubled land. We venture to suggest that Mandarin red would be a popular hue in that colorful, if unstable country. The gentleman referred to already represents a famous typewriter company among other organizations.

At the Recent Radio Exhibition

(*Continued from page 555*)

mass production. The Assistant Sales Manager of the Celoron Company, Mr. Daniel MacGugan, Jr., was in charge.

In spite of the seeming tendency to eliminate the laminated radio panel in favor of wood, several other manufacturers displayed laminated wares. Notable among these was the Formica Insulation Company with headquarters at Cincinnati, Ohio. Besides the usual punched and gold-decorated panels, this organization took advantage of the opportunity and displayed a goodly number of lithographed advertising panels. Laminated sheets in a number of realistic wood and marble effects furnished ample evidence that the future of these materials lay in the field of furniture and manufacturing. A cream colored material was much in evidence.

Westinghouse Micarta

The Westinghouse Electric Company's exhibit also included laminated panels (Micarta), as did that of the Spaulding Fiber Company.

Kellog Switchboard and Supply Company, Chicago, did not display any examples of molding as such, but featured a number of receiving sets in a very attractive manner. An outstanding feature of the Jewel Electrical Instrument Company's booth, was the number of instruments provided with molded cases. Worthy of mention was a portable voltmeter for radio use, with a molded clock-like case.

Courtesy

In MOLDED PRODUCTS for September, mention was omitted that the photographs of the office clock and Ediphone mouthpiece were furnished by Bakelite Corp. The molded whistle was also provided by this organization.

New Ideas in Bookmarks

A NEW style in bookmarks with edges sharp enough to enable them to be used as paper knives, is being marketed. Pyroxylin plastic forms the blades and these are capped by faces hand-painted in rubber, with facial expressions of interesting if rather sophisticated French types. Handmade headdresses lend a finishing touch to these interesting novelties. In all there are twelve different styles and two sizes.

Cigar Lighters

(*Continued from page 556*)

holes for contacts and attachment screws. In the same single operation, the lighter part is completed with ribs for gripping in front and instructions for operating on the back.

The method of using is to press the front part holding the heating elements into contact with the current leads in the base for a few moments, then to remove the former and light the cigarette against the red hot resistance element. To help the latter hold its temperature, very effective insulation is essential. Color and polish, permanent to handling, are further requirements successfully met by molding in phenol resinoid.

Incidentally this novel accessory is one more example of the extensive use of the molded part on automobiles. More than one hundred and fifty such parts are now in use, varying all the way from vanity cases to gear shift balls.

Molded Insulators

(*Continued from page 558*)

Each individual cord has great tensile strength and this is multiplied by the number of cords in the bundle forming the body of the insulator. Preferably, the cords are cut to correspond to the inside length of the mold. Since the mold is a closed one,

the amount of binder-treated cord introduced for each charge should be rather carefully determined, by weighing for instance. For many purposes, however, a small amount of cord material or binder over or under the predetermined requirement will not make any serious difference in the finished product.

Advandages of Cord

The use of cords as distinguished from closely woven fabric, such as canvas, not only permits of the production of articles of great tensile strength, but also results in articles of very uniform density, The fact that the cords are round and not tightly fastened to each other, as is the case in a closely woven fabric, permits them to adjust themselves while in the mold thereby equalizing the pressure throughout. The use of cords also minimizes the danger of formation of pockets containing only binder.

Strength Tests

On testing, a stud molded in this way, with a diameter of ¾-inch and nuts ¾inch in thickness, withstood 4,000 pounds, when one of the nuts split and at the same time partially sheared some of the threads. Such studs are from 40 to 50% stronger than fiber studs and are also more resilient so that there is less danger of collapse under schock or undue stress.

Such molded parts are covered by U .S. Patent, 1,640,433, issued to John I. Weldon on August 30, 1927, and assigned to the General Electric Company.

"The Molded Part in the Furniture Industry"

In An Early Issue

Advertisers Index

Say you saw it in PLASTICS

BUYERS' GUIDE

ACCUMULATORS
The Burroughs Co.
The Dunning & Boschert Press Co. Inc.
Hydraulic Press Mfg. Co.
The Adamson Machine Co.
Chas. F. Elmes Engineering Works
French Oil Machinery Co.
R. D. Wood
A. B. Farquhar

ALADDINITE
Aladdinite Co.

ASBESTOS
E. Gross & Co., Hartford, Conn.

BAKELITE
Bakelite Corporation

BLEACHED SHELLAC
Geo. H. Lincks

BLOOD
Jungmann & Co.

BOILERS
Syracuse Steam Generator, Inc.

CAMPHOR (Synthetic)
C. B. Peters Co.

CASEIN
Jungmann & Co.
T. M. Duche

CASEIN PLASTICS
Aladdinite Chemical Products Co.
Karolith Corp.
Erinoid Co. of America
American Machine & Foundry Co.

CELORON
Celoron Co.

CELLULOID
Celluloid Co.

CELLULOID SCRAP
Johnson Products Co., Inc.

CELLULOSE ACETATES
Jos. H. Meyer Bros.
American British Chemical Supplies Co.

COLASTA
Colasta Co., Inc.

COTTON FLOCK
Peckham Mfg. Co.

CUSTOM MOULDERS
American Insulator Co.
Allen & Hills, Auburn, N. Y.
Auburn Button Co., Auburn, N. Y.
Braylite Molding Corp., Jersey City, N. J.
Boonton Molding Co., Boonton, N. J.
Celoron Co.
Chicago Molded Prod. Co., Chicago, Ill.
Diemoulding Production Co., Canastota, N.Y.
General Elec. Co.
General Molded Comp. Co., Lynn, Mass.
General Industries Inc.
International Insulating Co. Inc.
Keystone Specialty Mfg. Co., Cleveland, O.
Chas. Klagges
Kellogg Switchboard & Supply Co.
Kuhn & Jacob, Trenton, N. J.
Mack Molding Co., Little Falls, N. J.
Modern Molded Prod. Co., Providence, R. I.
Northern Indus. Chem. Co., Boston, Mass.
Norton Laboratories, Lockport, N. Y.
Recto Mfg. Co., Cincinnati, Ohio
Schneider Elec. & Mfg. Co., Chicago, Ill.
Scranton Button Co., Scranton, Pa.
Shaw Insulator Co.
Siemon Co.

DIES
Standard Tool Co.
Grimes & Harris

DUREZ
General Plastics Inc.

ERINOID
Erinoid Co. of America

FIBERLOID
Fiberloid Corp.

GLASS, SILVERED
Standard Mirror Co.
Tassi Bros.

GUMS
France, Campbell & Darling
Geo. H. Lincks
Wm. H. Scheel

HYDRAULIC EQUIPMENT
Evarts G Loomis Co.
Hydraulic Press Mfg. Co.
Terkelsen Machine Co.
Burroughs Co., The,
Watson-Stillman Co.
Chas. F. Elmes Engineering Works
Southwark Foundry & Mach. Co.
Dunning & Boschert Press Co.
French Oil Mill Machinery Co.
A. B. Farquhar
R. D. Wood Corp.

INDA
American Machine & Foundry Co.

KAROLITH
Karolith Corp.

LABELS
Economy Ticket & Label Co.

MANICURE ARTICLES
E. J. Bates & Sons, Chester, Conn.

MEASURING MACHINES
F. J. Stokes Mach. Co.

MIRRORS
Standard Mirror Co.
Tassi Bros.

MOLDING POWDERS
Bakelite Corp.
Celoron Co.
Colasta Co., Inc.
General Plastics., Inc.

PEARL COATING
American Pearl Essence Co.
Jos. H. Meyer Bros.
Paispearl Co.
Specialty Pearl Mfg.
E. W. Wiggins
Geo Morrell, Inc.

PHENOL RESINS
Bakelite Corporation
General Plastics Inc.
Colasta Co., Inc.
Celoron Co.

PUMPS—HYDRAULIC
The Dunning & Boschert Press Co. Inc.
Hydraulic Press Mfg. Co.
Chas. F. Elmes Engineering Works
French Oil Mch. Co.
R. D. Wood Corp.
A. B. Farquhar
Terkelsen Machine Co.

PYROXYLIN PLASTICS
Fiberloid Corp.
Nixon Nitration Works
Celluloid Co.
Jos. H. Meyer Bros.
Du Pont Viscoloid Co.
American Celutex Corp.
E. W. Wiggins
The Rubber & Celluloid Prod. Co.

RECLAIMERS
Johnson Products Co., Inc.

ROLLING MACHINERY
Evarts G. Loomis Co.

SCRAP
Johnson Products Co., Inc.

SHELLAC
Geo. H. Lincks
Wm. H. Scheel
Henry W. Peabody Co.

SWING JOINTS
Burroughs Co., The,
Evarts G. Loomis Co.
French Oil Machinery Co.
Hydraulic Press Mfg. Co.
Flexo Supply Co.

TICKETS
Economy Ticket & Label Co.

TOOLS
Standard Tool Co.

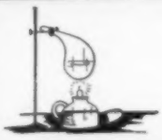
TUMBLING
Rudolph R. Siebert

VARNISHES
Celoron Co.

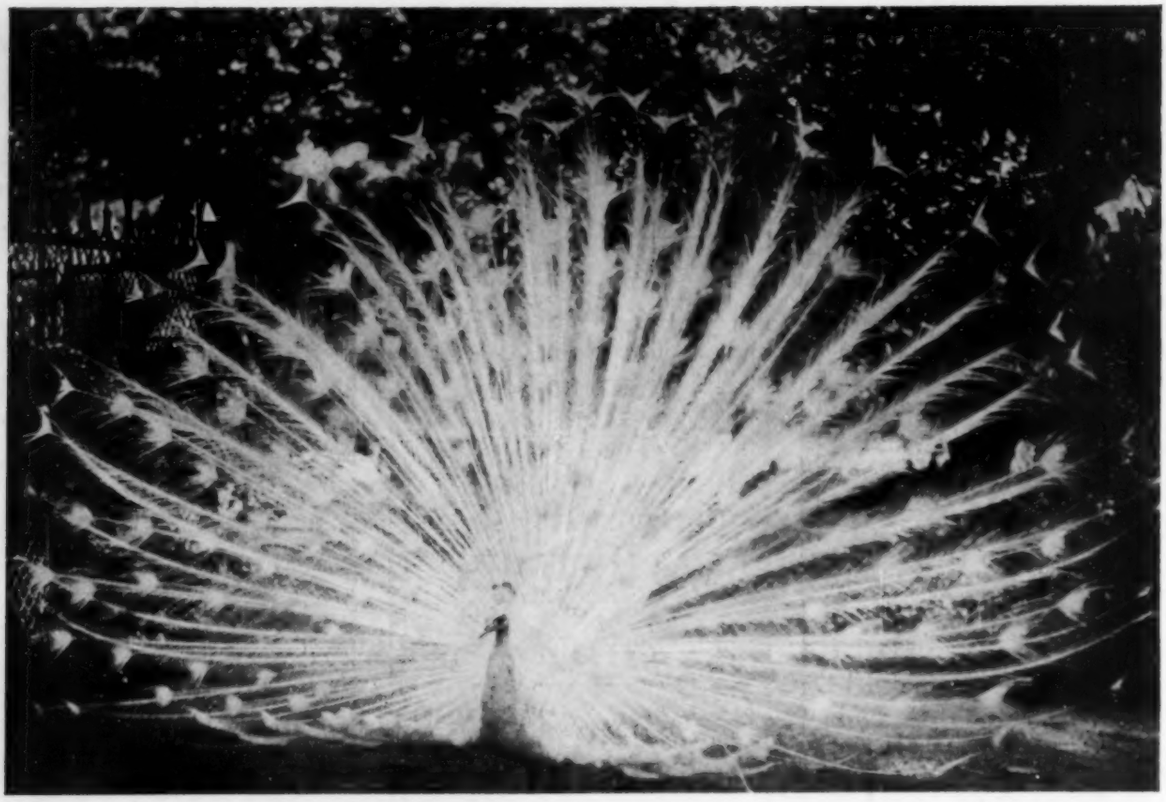
VISCOLOID
Du Pont Viscoloid Co.

WOOD FLOUR
Acme Oil Co.
Becker Moore Co.
John C. Hoornbeek's Sons Co.
C. B. Peters Co.
S. S. Spiro
Burnett Co.
Jungmann & Co.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in PLASTICS. Please mention PLASTICS when writing to these firms.



Materials
for the Plastics Industries



Beauty and Color

THE peacock, beautiful, scintillating, colorful, a creature of variegated hue best exemplifies the effects obtained with Colasta.

Molded parts of this material can be made in a matchless variety of colors that meet innumerable requirements, not only vivid, plain colors, but many mottle effects can be obtained with this versatile material.

Colasta

Reg. U. S. Patent Office

Write for further information.

THE COLASTA CO., Inc.

Hoosick Falls, N. Y.

Protected by U. S. Letters Patent 1251862 and 1251863

NIXONOID

SHEETS

RODS

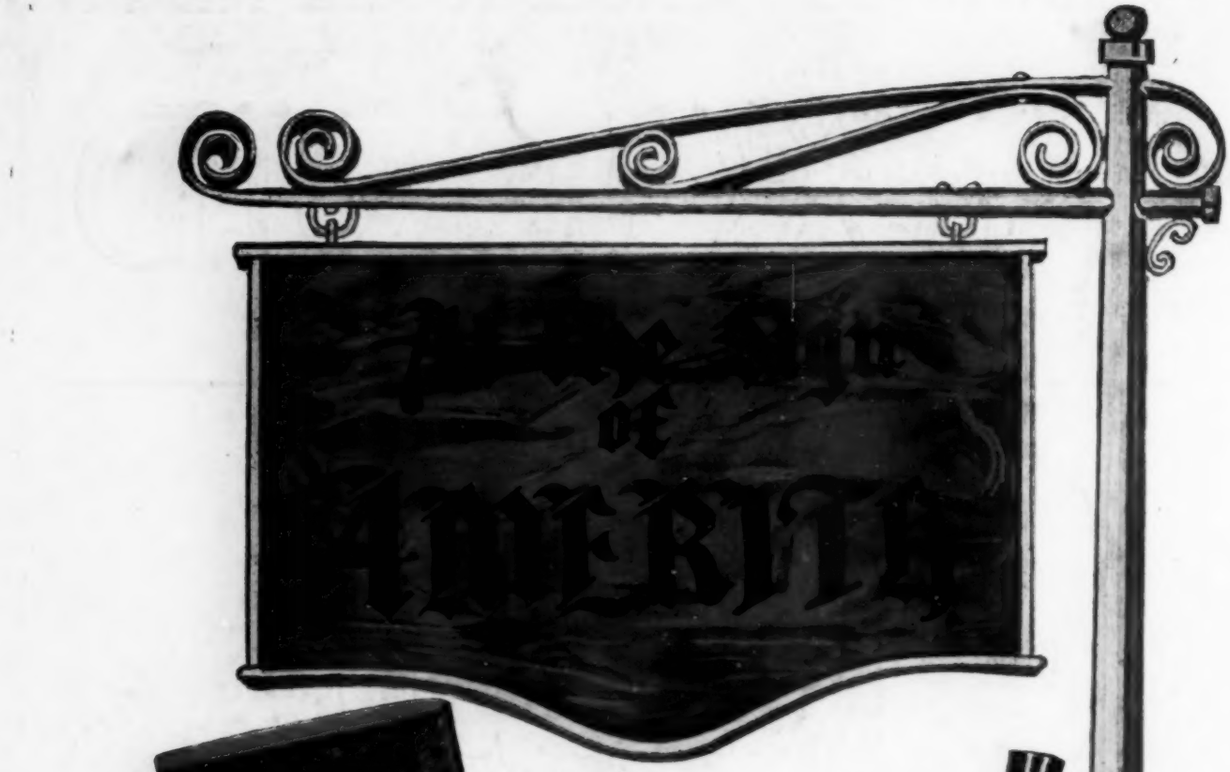
TUBES

NIXON NITRATION WORKS
NIXON
NEW JERSEY

E. W. Wiggins
New England Representative
Leominster, Mass.

Southern Representative
E. N. Phillips
134 W. Commerce St., High Point, N. C.

W. L. Cratty, Wrigley Bldg., Chicago, Ill.
Western Representative



THE PIONEER STILL PROGRESSES

From the time of John Hyatt, the Celluloid Company has shown the way to the industry in all outstanding developments:-

1870—Celluloid-the first pyroxylin plastic.
1873—Celluloid in tube form.
1878—Tortoise Shell of Celluloid.
1890—An endless, jointless film base such as now universally used for motion pictures.
1912—An absolutely non-inflammable photo film-"Protectoid."
1927—The first in this country commercially to enter the plastics field with a non-inflammable material possessing the working qualities of Celluloid.

CELLULOID CORPORATION

290 Ferry Street, Newark, N. J.

Sales Offices: 58 West 40th St., New York City

36 South State St.
Chicago

97 Water St.
Leominster

340 Sansome St.
San Francisco

188 Morris Ave.
Providence

52 Chauncy St.
Boston